Linear_regression_report

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```
## Loading required package: DBI

## Loading required package: lattice

##
## Attaching package: 'boot'

## The following object is masked from 'package:lattice':
##
##     melanoma

##
## Attaching package: 'MASS'

## The following object is masked from 'package:DAAG':
##
##     hills
```

Introduction

The aim of the project was to be able to find a model that best predict the relationship between: * the number of people counted with the survey for a given class at a particular hour * Wi-fi log counted in that room at that hour

This will allow to see whether Wi-Fi log is a good predictor for estimating occupancy in a classroom.

We first tried to see if the relationship between this two variables was linear. To do so we run a linear regression.

Below we describes step by step all the analysis performed.

ANALYSIS

First of all, we set up the connection to the database, using the following code:

```
connection <- dbConnect(MySQL(),user="root", password="",dbname="who_there_db", host="localhost")
```

Then we made a query to the database, in order to get all the groundth truth data collected in room B.002, B.004 and B.006 from 9 to 17 and the correspondent Wi-Fi Log measured in that time frame and rooms.

The dataset created had in total 216 rows and it will allow us to explore if Wi-Fi log is a good predictor of the observed occupancy of the room in a certain hour.

As a **target features** for our linear regression we decided to use the number of associated client, calculated by multiplying the percentage of the room with the capacity of the room.

As response variables or feature we considered Wi-Fi logs, which were summarised either as average of the logs counted for each room and for each hour or as maximum of the logs measured for each room and for each hour.

Together with the Wi-Fi log, we included in the data set the following features:

- **Date**, which we did not use in this analysis, because they just cover 2 weeks of Novemeber, but for future analyses they can be used to group observations by seasons or semesters or to finds seasonal trends for time series analyses.
- **Time**, which will be explored either as continous variable and as categorical to explore if the time of the day can have an affect on the Wi-Fi log. To do so we, bin the time in 4 ranges: early morning (9-11), late morning (11-13), early afternoon (13-15) and late afternoon (15-17). This will allow us to see if the Wi-Fi log accuracy was changing during the day. For example, it is more likely that all the electronic devices are fully powered early in the morning and consequently the Wi-fi log data can be more accurate or overestimating the occupancy of the room (i.e. more than one device per person). On the contrary in the afternoon, the devices may be more likely to be out of battery and it is possible that there are less devices in the room.
- **Module**, which we are not going to include it in the analysis because the majority of the module present are for computer science. For future analyses it will be possible to explore if the accuracy of Wi-fi log in predicting the occupancy change across the courses. Science courses (especially computer science courses) will be more likely to use electronic devices during lectures than art students.
- **Course level**, which can indicate us whether electronic devices will be less used during different course levels. For example, first and second level courses can be more theoretical than the upper levels. Therefore, we might expect less connections. However, undergraduates might be more distracted during lectures and look at their phones. This will result in an increase of connections in that hour.
- **Tutorial**, which can affect the number of logged people. First of all, because tutorial divided the room in 2 and therefore there will be measured less people than expected.
- **Double_module**, categorical variable indicating whether in the class there are more than one module, increasing the number of people expected in the room.
- **class_went_ahead**, categorical variable indicating whether in the class went ahead to check for false positive.

The resulting data set is printed below:

```
head(AnalysisTable)
```

```
##   Room       Date Time    Module Course_Level Tutorial Double_module
## 1    1 2015-11-03    9         0            0        0             0
## 2    1 2015-11-04    9 COMP30190            3        0             0
## 3    1 2015-11-05    9         0            0        0             0
## 4    1 2015-11-06    9 COMP30220            3        0             0
## 5    1 2015-11-09    9 COMP30190            3        0             0
## 6    1 2015-11-10    9         0            0        0             0
##   Class_went_ahead Capacity Percentage_room_full Wifi_Average_logs
## 1                1       90                 0.00           4.7500
## 2                1       90                 0.25          13.4545
## 3                1       90                 0.00           6.8333
## 4                1       90                 0.00           2.4167
## 5                1       90                 0.25          14.7273
```

```
## 6                1       90                 0.00            2.2727
##   Wifi_Max_logs Survey_occupancy   Factor_Time
## 1            21              0.0 Early Morning
## 2            15             22.5 Early Morning
## 3            29              0.0 Early Morning
## 4             3              0.0 Early Morning
## 5            18             22.5 Early Morning
## 6            14              0.0 Early Morning
```

DATA QUALITY REPORT

Before running any analyses, we carried out the data quality report to check for any issue related to the variables (e.g. outlier, skewed distribution, NaN values) and we planned the solutions that we implemented to solve them.

Initially we set all the categorical variables as factors and then we printed the descriptive statistics for all the features.

```
summary(AnalysisTable)
```

```
##       Room       Date                Time          Module
##  Min.   :1   Length:216         Min.   : 9.00   Length:216
##  1st Qu.:1   Class :character   1st Qu.:10.75   Class :character
##  Median :2   Mode  :character   Median :12.50   Mode  :character
##  Mean   :2                      Mean   :12.50
##  3rd Qu.:3                      3rd Qu.:14.25
##  Max.   :3                      Max.   :16.00
##  Course_Level    Tutorial       Double_module Class_went_ahead
##  0:59         Min.   :0.00000   0:210         0: 22
##  1:14         1st Qu.:0.00000   1:  6         1:194
##  2:23         Median :0.00000
##  3:76         Mean   :0.02778
##  4:40         3rd Qu.:0.00000
##  5: 4         Max.   :1.00000
##     Capacity     Percentage_room_full Wifi_Average_logs Wifi_Max_logs
##  Min.   : 90.0   Min.   :0.00         Min.   :  0.00    Min.   :  0.00
##  1st Qu.: 90.0   1st Qu.:0.00         1st Qu.: 11.61    1st Qu.: 18.75
##  Median : 90.0   Median :0.25         Median : 23.67    Median : 32.50
##  Mean   :113.3   Mean   :0.25         Mean   : 30.33    Mean   : 40.01
##  3rd Qu.:160.0   3rd Qu.:0.25         3rd Qu.: 43.88    3rd Qu.: 55.25
##  Max.   :160.0   Max.   :1.00         Max.   :192.92    Max.   :230.00
##  Survey_occupancy          Factor_Time
##  Min.   :  0.00   Early Morning  :54
##  1st Qu.:  0.00   Late Morning   :54
##  Median : 22.50   Early Afternoon:54
##  Mean   : 28.01   Late Afternoon :54
##  3rd Qu.: 40.00
##  Max.   :160.00
```

From this we could see that NaN values were not present in the data set. We could notice that the observations for the features Tutorials and Double_model were not even distributed across the 2 levels of the variables. In fact, only 6 observations were present for tutorial class and for double module class. Therefore, we decided to discard both the features, because they will be not informative for the analysis. Similarly for the feature

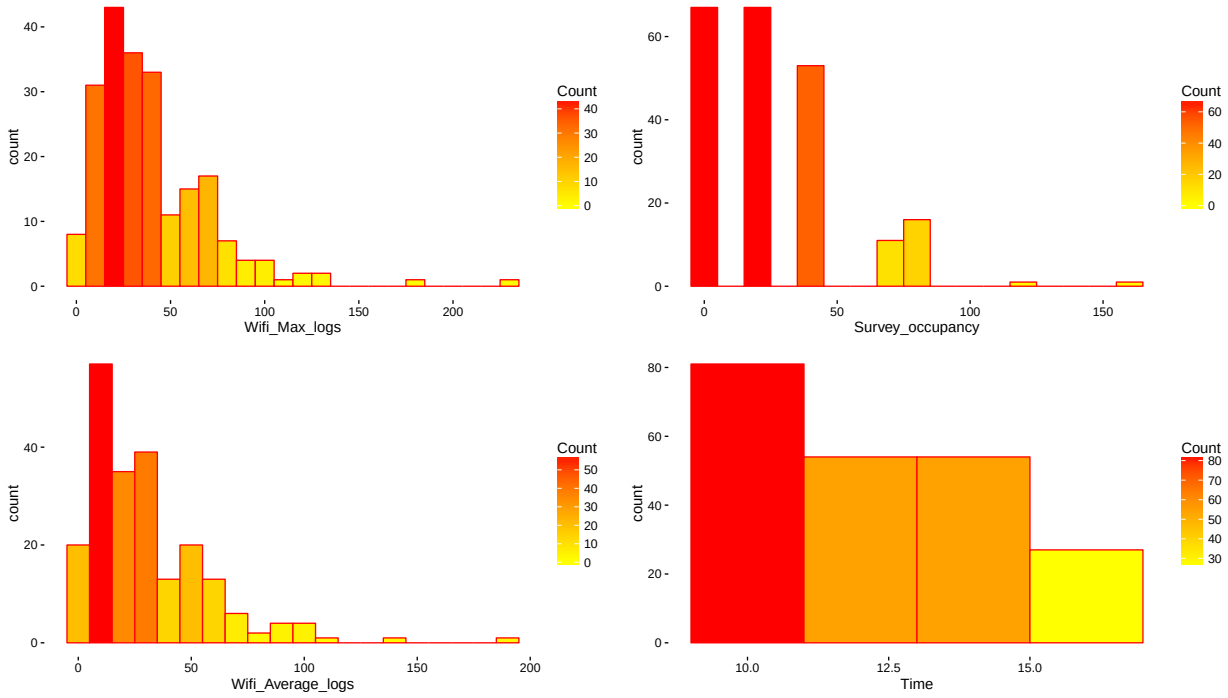
class_went_ahead the majority of the lectures did not have similar distribution of the observations among the the features levels and we decided to discard it. Furthermore, for the variables Wifi_Average_clients, Wifi_Max_clients and Survey_occupancy it seems that there were few outliers, since the median is lower than the mean and the max values were far higher than the mean values. We will going to explore this issues with histogram and boxplots.

Exploratory graphs

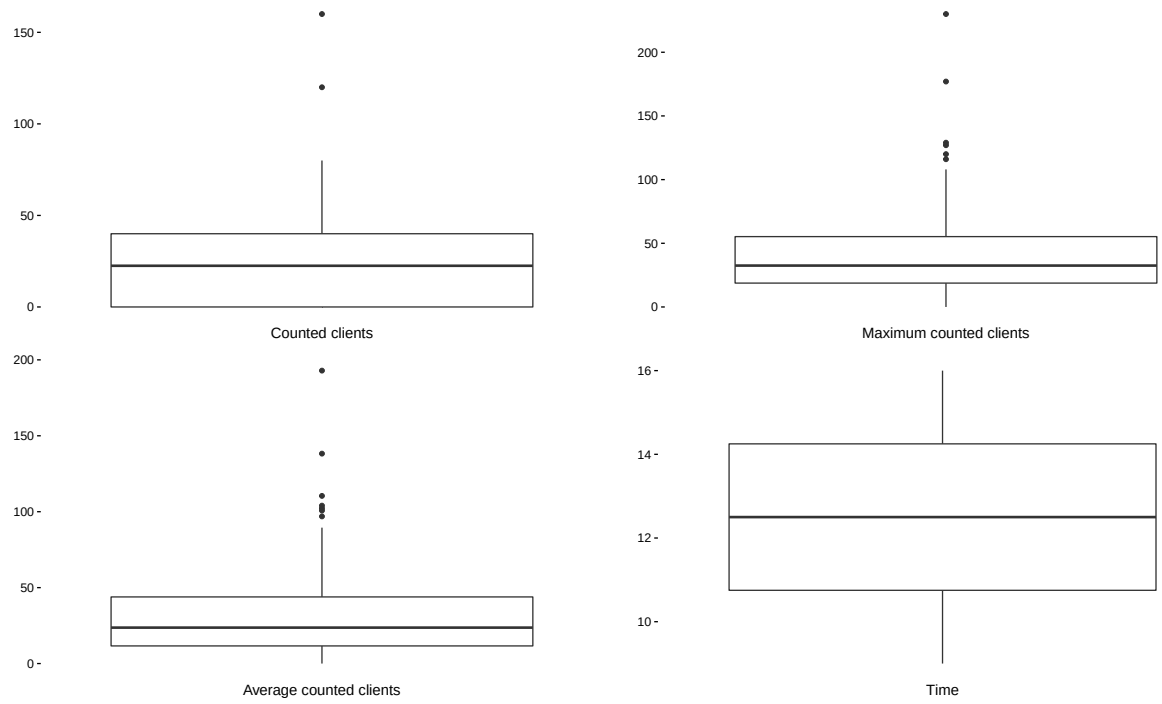
For exploring possible issues related with the continuous variables we plotted histograms and boxplots.

Histograms

```
## Loading required package: grid
```



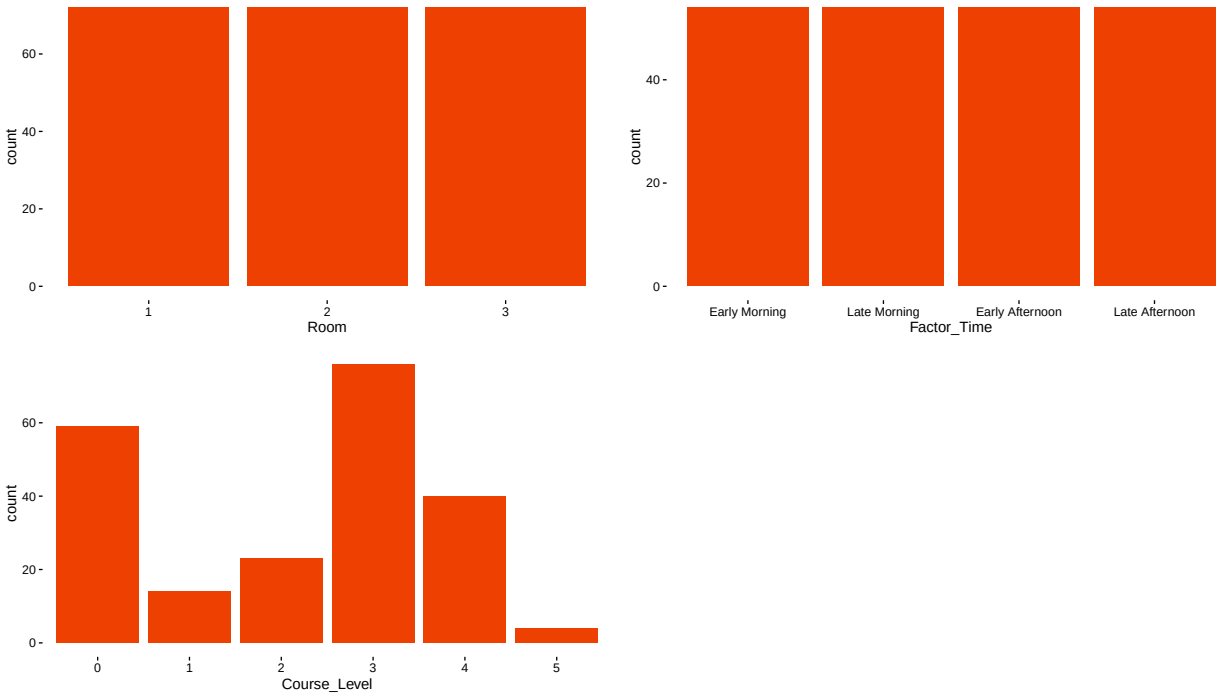
Form the histograms we could see that the distribution of the feature Wifi Maximum_client (i.e. the Maximum number of devices logged in one hour lecture) was skewed to the left, indicating that no more than 40 people attended the majority of the lectures. Furthermore, we could see that there were potential outliers (values > 150). Similar patterns were observed for the feature Wifi_Average_clients. Different was the situation of the target feature, Survey_counted client, which showed a skewed distribution, but more scattered, similar to a Poisson distribution. This could cause a problem in running a linear regression and more likely we have have to run a generalise linear model with a Poisson distribution. This is not surprising, since we are dealing with count data (Zuur et al. 2009). Feature times had as well a skewed distribution, suggesting that the majority of the lectures were concentrating during the early morning and they were decreasing towards the afternoon.



Boxplots

From the boxplots, all the trends observed in the histograms were confirmed.

For categorical variables we plotted bar plot graphs.



Bar plots

From the barplots, we could see that observations were equally distributed across all the levels of the feature Room and Factor Time. On the contrary, there were more observations for non lectures and level 3 courses. No issues were detected for those features.

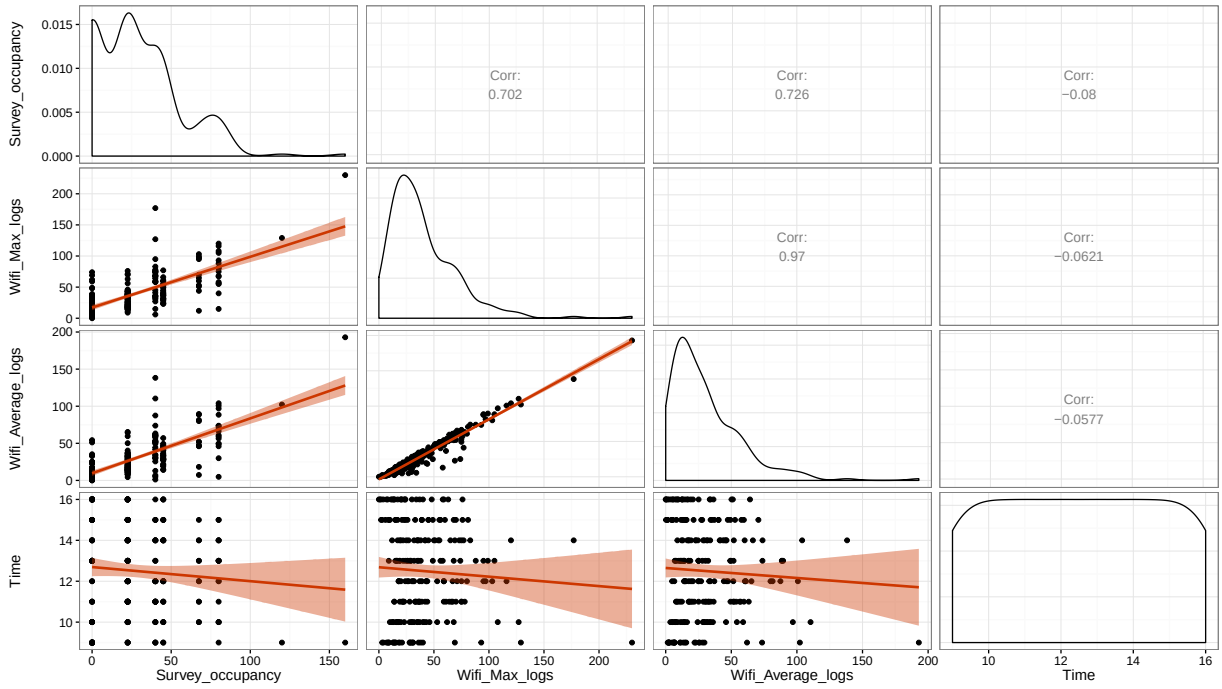
Summary

Features	Issues	Planned Solution
Room	None	None
Time	Distibution skewed to the left	To solve during analysis
Factor Time	None	None
Course level	None	None
Tutorial	Uneven representation of the level	Discarded from the analysis
Double Module	Uneven representation of the level	Discarded from the analysis
Class went ahead	Uneven representation of the level	Discarded from the analysis
Wifi Average clients	Distibution skewed to the left & outliers	To solve during analysis
Wifi Maximum clients	Distibution skewed to the left & outliers	To solve during analysis
Survey Counted clients	Distibution skewed to the left & outliers	To solve during analysis

FEATURES AFFECTING THE TARGET FEATURE

The next step of the analysis was to see which features were more likely determining the occupancy of the class.
For the continuous features we explored the effects on the target features using a correlation matrix, while for the categorical features we used box plots.

Correlation matrix for continuous variables.

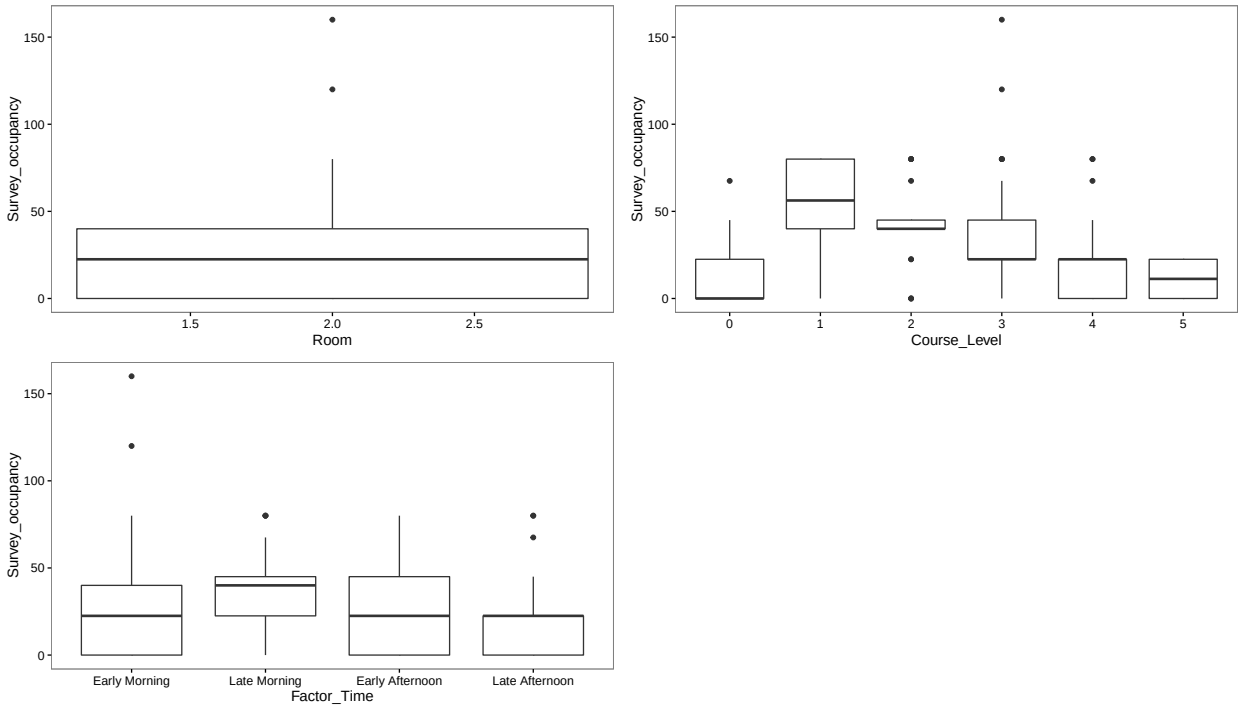


From the correlation matrix Survey counted clients seems to have a good correlation with Wifi Average counted clients and Maximum counted clients, therefore we are will try to run 2 models: one for exploring the relationship between Survey counted clients and Average counted clients and another for Survey counted clients and Maximum counted clients. However, from this graphs we can see that there is one point that is clearly two outliers. Therefore, we are going to run the analyses with and without them.

From the graphs we can see that Average counted clients and Maximum counted clients are highly correlated showing that both of them are not so different. Therefore we will not expect too much difference among the 2 models.

Time does not seems to be correlated with the target features Survey counted clients and it seems more categorical.

Box plots for categorical variables.



From the boxplot plotting the counted people in the different room, it can be observed that the average of the counted people in room 1 was not different from room2. Room3 had an higher number of people on average, but this can be due to the outlier. The average number of counted people, instead, changed across the different course levels and it will be worth to explore if the occupancy of the room was affected by the course level. The highest average number of counted people was in the late morning around 50, while it was around 30 for the rest of the day. Therefore it will be interesting to explore the effect of the time on the occupancy.

Analysis

For selecting the features that together with the max logs or with the average logs best predict the ground truth data we will do model selection with a method similar to the one used by James et al. (2013).
For doing so, instead, of using the function regsubset for selecting all the possible models, we decided to considered the following models, because they better suits our hypothesis:

- $Surveyoccupancy \sim 1$, the null model;
- $Surveyoccupancy \sim AverageWifioccupancy$, for testing whether average Wi-Fi counting logs were accurately predicting the occupancy of the room;
- $Surveyoccupancy \sim AverageWifioccupancy + Room$, for testing whether average Wi-Fi counting logs and the room were were accurately predicting the occupancy of the room;
- $Surveyoccupancy \sim AverageWifioccupancy + Time$, for testing whether average Wi-Fi counting logs and the time of the day were accurately predicting the occupancy of the room;

- $Surveyoccupancy \sim AverageWifioccupancy + Course_Level$, for testing whether average Wi-Fi counting logs and course levels were accurately predicting the occupancy of the room;
- $Surveyoccupancy \sim AverageWifioccupancy + Room + Time$, for testing whether average Wi-Fi counting logs, room type and the time of the day were accurately predicting the occupancy of the room;
- $Surveyoccupancy \sim AverageWifioccupancy + Room + Course_Level$, for testing whether average Wi-Fi counting logs, room type and course levels were accurately predicting the occupancy of the room;
- $Surveyoccupancy \sim AverageWifioccupancy + Time + Course_Level$, for testing whether average Wi-Fi counting logs, the time of the day and the course levels were accurately predicting the occupancy of the room;
- $Surveyoccupancy \sim AverageWifioccupancy + Room + Time + Course_Level$, for testing whether average Wi-Fi counting logs, rooms, the time of the day and the course levels were accurately predicting the occupancy of the room;

The same models were run also with the occupancy estimated with the maximum number of logs measured in that hour. All these models were run using the k-fold cross. K-fold validation was preferred over the validation set approach and the Leave Out Cross Validation (LOOCV), because it is more robust and more accurate in estimating the test error. The Validation set approach tends to give an over estimate of the test error and the test error is dependent on the observations included randomly in the test set. Furthermore, the LOOCV tends to provide a test error with a high variance, because the folds used to calculating it are correlated among each other. In particular in this analysis we are going to perform a 10-fold cross validation, which is pretty standard.

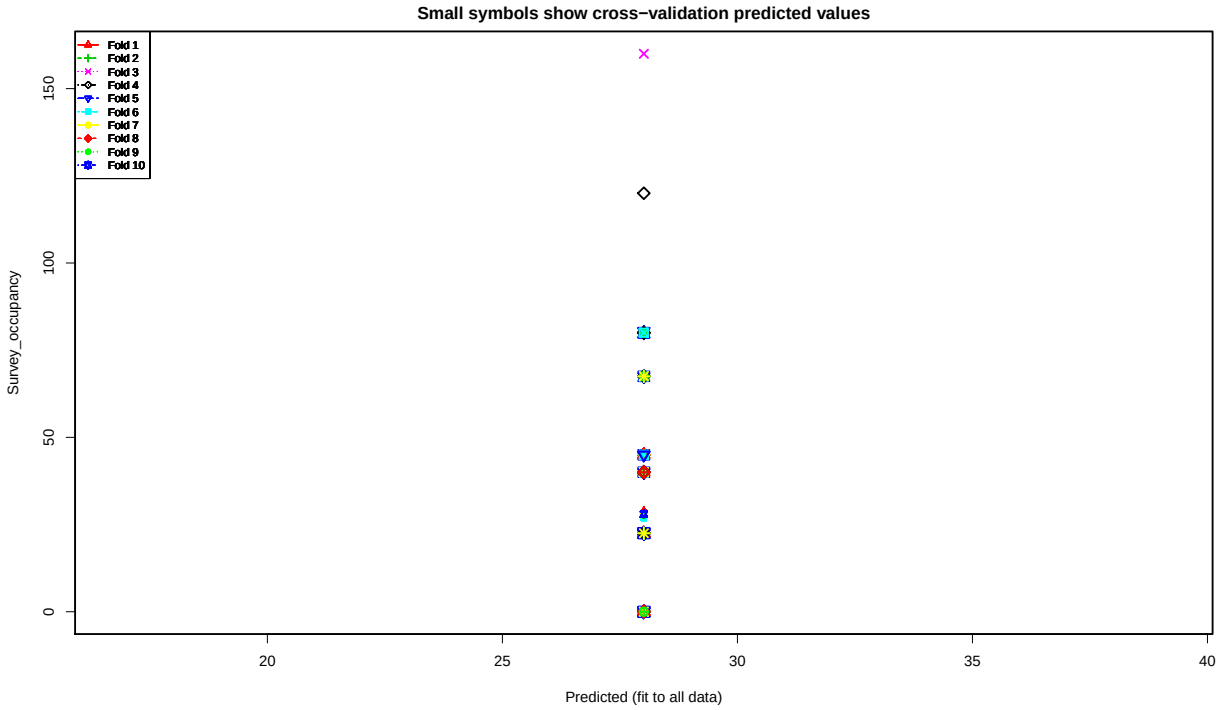
The 10 fold cross validation was carried out with the package, CVglm. For each model we estract the overall mean square error(MSE) and we picked as best model the model with the lowest MSE.

Results

CASE1: Wi-Fi Average logs

All the models ran with the response variable Wifi average logs are summarised in the following table showing their MSE.

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##            Df Sum Sq Mean Sq F value Pr(>F)
## Residuals 215 151981     707
```




```
##
## fold 1
## Observations in test set: 21
##                       4     6    24    25   28    34    35    56   67    72
## Predicted         28.0  28.0 28.01 28.01 28.0 28.01 28.01  28.0 28.0 28.01
## cvpred            28.9  28.9 28.88 28.88 28.9 28.88 28.88  28.9 28.9 28.88
## Survey_occupancy   0.0   0.0 22.50 22.50 45.0 22.50 22.50   0.0 45.0 22.50
## CV residual      -28.9 -28.9 -6.38 -6.38 16.1 -6.38 -6.38 -28.9 16.1 -6.38
##                      80    89   90    94  105   108   112   138  149  165
## Predicted         28.0  28.0 28.0 28.01 28.0 28.01  28.0  28.0 28.0 28.0
## cvpred            28.9  28.9 28.9 28.88 28.9 28.88  28.9  28.9 28.9 28.9
## Survey_occupancy   0.0   0.0 45.0 22.50 45.0 22.50   0.0   0.0 40.0 40.0
## CV residual      -28.9 -28.9 16.1 -6.38 16.1 -6.38 -28.9 -28.9 11.1 11.1
##                     211
## Predicted         28.0
## cvpred            28.9
## Survey_occupancy   0.0
## CV residual      -28.9
##
## Sum of squares = 8246    Mean square = 393    n = 21
##
## fold 2
## Observations in test set: 22
##                       12    21    22    30    42    49    76   81   96   117
## Predicted         28.0 28.01 28.01 28.01 28.01 28.01 28.01 28.0 28.0  28.0
## cvpred            28.6 28.57 28.57 28.57 28.57 28.57 28.57 28.6 28.6  28.6
## Survey_occupancy 45.0 22.50 22.50 22.50 22.50 22.50 22.50 45.0 45.0   0.0
## CV residual      16.4 -6.07 -6.07 -6.07 -6.07 -6.07 -6.07 16.4 16.4 -28.6
##                     121   123   125   135   136   140   148   171   189  190
## Predicted         28.0 28.01 28.01 28.01  28.0 28.01  28.0  28.0  28.0 28.0
```

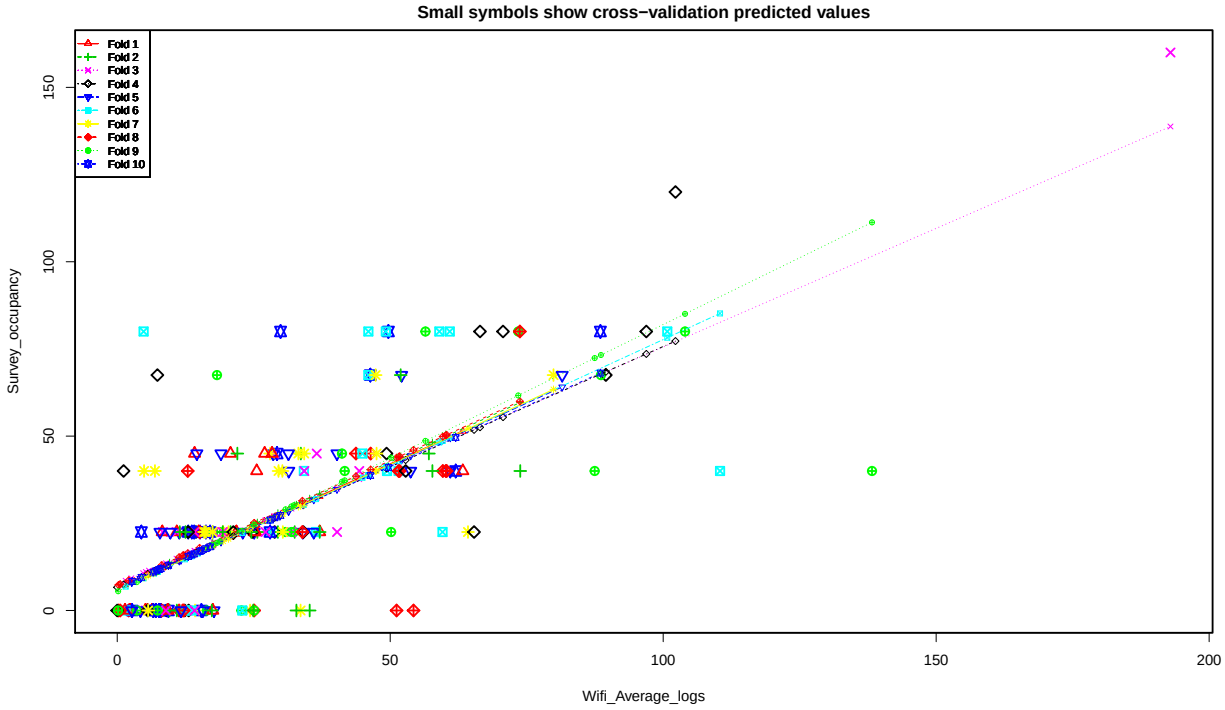
```
## cvpred           28.6 28.57 28.57 28.57  28.6 28.57  28.6  28.6  28.6 28.6
## Survey_occupancy 67.5 22.50 22.50 22.50   0.0 22.50   0.0   0.0   0.0 40.0
## CV residual      38.9 -6.07 -6.07 -6.07 -28.6 -6.07 -28.6 -28.6 -28.6 11.4
##                   199   205
## Predicted        28.0  28.0
## cvpred           28.6  28.6
## Survey_occupancy 40.0   0.0
## CV residual      11.4 -28.6
##
## Sum of squares = 7852    Mean square = 357    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     8    13   19    20    40    48    54
## Predicted         28.0 28.01  28.0  28.0 28.0 28.01 28.01 28.01 28.01
## cvpred            28.4 28.44  28.4  28.4 28.4 28.44 28.44 28.44 28.44
## Survey_occupancy   0.0 22.50   0.0   0.0 45.0 22.50 22.50 22.50 22.50
## CV residual      -28.4 -5.94 -28.4 -28.4 16.6 -5.94 -5.94 -5.94 -5.94
##                     55    73    79    83    87   95   100   131   147  167
## Predicted        28.01  28.0  28.0 28.01  28.0 28.0 28.01 28.01  28.0 28.0
## cvpred           28.44  28.4  28.4 28.44  28.4 28.4 28.44 28.44  28.4 28.4
## Survey_occupancy 22.50   0.0   0.0 22.50   0.0 45.0 22.50 22.50 160.0 40.0
## CV residual      -5.94 -28.4 -28.4 -5.94 -28.4 16.6 -5.94 -5.94 131.6 11.6
##                   174   182   191
## Predicted        28.0  28.0  28.0
## cvpred           28.4  28.4  28.4
## Survey_occupancy 40.0   0.0   0.0
## CV residual      11.6 -28.4 -28.4
##
## Sum of squares = 24912    Mean square = 1132    n = 22
##
## fold 4
## Observations in test set: 22
##                      3    11    17    18    27    45   57    69   82   103
## Predicted         28.0 28.01 28.01  28.0  28.0  28.0 28.0 28.01 28.0 28.01
## cvpred            27.2 27.18 27.18  27.2  27.2  27.2 27.2 27.18 27.2 27.18
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.0 22.50 67.5 22.50
## CV residual      -27.2 -4.68 -4.68 -27.2 -27.2 -27.2 17.8 -4.68 40.3 -4.68
##                    107  110   127   134   145  154  195  203  204  206
## Predicted        28.01 28.0 28.01 28.01  28.0 28.0 28.0 28.0 28.0 28.0
## cvpred           27.18 27.2 27.18 27.18  27.2 27.2 27.2 27.2 27.2 27.2
## Survey_occupancy 22.50 67.5 22.50 22.50 120.0 80.0 80.0 80.0 40.0 40.0
## CV residual      -4.68 40.3 -4.68 -4.68  92.8 52.8 52.8 52.8 12.8 12.8
##                    208   210
## Predicted         28.0  28.0
## cvpred            27.2  27.2
## Survey_occupancy   0.0   0.0
## CV residual      -27.2 -27.2
##
## Sum of squares = 25470    Mean square = 1158    n = 22
##
## fold 5
## Observations in test set: 22
##                      7   33   47   53   60   70    75   86   91    92   98
```

```
## Predicted        28.0 28.0 28.0 28.0 28.0 28.0  28.0 28.0 28.0  28.0 28.0
## cvpred           27.9 27.9 27.9 27.9 27.9 27.9  27.9 27.9 27.9  27.9 27.9
## Survey_occupancy 22.5 22.5 22.5 45.0 45.0 22.5   0.0 22.5 67.5   0.0 22.5
## CV residual      -5.4 -5.4 -5.4 17.1 17.1 -5.4 -27.9 -5.4 39.6 -27.9 -5.4
##                   106  114  118  139   141  142  158  168  176   202   213
## Predicted        28.0 28.0 28.0 28.0  28.0 28.0 28.0 28.0 28.0  28.0  28.0
## cvpred           27.9 27.9 27.9 27.9  27.9 27.9 27.9 27.9 27.9  27.9  27.9
## Survey_occupancy 67.5 22.5 45.0 45.0   0.0 45.0 40.0 40.0 40.0   0.0   0.0
## CV residual      39.6 -5.4 17.1 17.1 -27.9 17.1 12.1 12.1 12.1 -27.9 -27.9
##
## Sum of squares = 9134    Mean square = 415    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85  126   128   137   143
## Predicted        28.01  28.0 28.01 28.01 28.01 28.0 28.0  28.0  28.0  28.0
## cvpred           26.84  26.8 26.84 26.84 26.84 26.8 26.8  26.8  26.8  26.8
## Survey_occupancy 22.50   0.0 22.50 22.50 22.50 67.5 45.0   0.0   0.0   0.0
## CV residual      -4.34 -26.8 -4.34 -4.34 -4.34 40.7 18.2 -26.8 -26.8 -26.8
##                    151  156  157  159  169  170  172  173  184  197   200
## Predicted         28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0  28.0
## cvpred            26.8 26.8 26.8 26.8 26.8 26.8 26.8 26.8 26.8 26.8  26.8
## Survey_occupancy   0.0 40.0 80.0 40.0 40.0 40.0 80.0 80.0 80.0 80.0   0.0
## CV residual      -26.8 13.2 53.2 13.2 13.2 13.2 53.2 53.2 53.2 53.2 -26.8
##                   207
## Predicted        28.0
## cvpred           26.8
## Survey_occupancy 80.0
## CV residual      53.2
##
## Sum of squares = 24028    Mean square = 1092    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99  101
## Predicted         28.0 28.0  28.0 28.0  28.0 28.01 28.0 28.01 28.01 28.0
## cvpred            27.9 27.9  27.9 27.9  27.9 27.93 27.9 27.93 27.93 27.9
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0 22.50 45.0 22.50 22.50 67.5
## CV residual      -27.9 17.1 -27.9 17.1 -27.9 -5.43 17.1 -5.43 -5.43 39.6
##                   104   111   120  130   132   144  146   153  166  175
## Predicted        28.0 28.01 28.01 28.0 28.01 28.01 28.0  28.0 28.0 28.0
## cvpred           27.9 27.93 27.93 27.9 27.93 27.93 27.9  27.9 27.9 27.9
## Survey_occupancy 45.0 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual      17.1 -5.43 -5.43 39.6 -5.43 -5.43 12.1 -27.9 12.1 12.1
##                   185   214
## Predicted        28.0  28.0
## cvpred           27.9  27.9
## Survey_occupancy 40.0   0.0
## CV residual      12.1 -27.9
##
## Sum of squares = 8987    Mean square = 408    n = 22
##
## fold 8
## Observations in test set: 21
```

```
##                       16    38   51    63    74  102   109   122   129   162
## Predicted          28.0  28.0 28.0 28.01  28.0 28.0  28.0 28.01  28.0  28.0
## cvpred             28.7  28.7 28.7 28.69  28.7 28.7  28.7 28.69  28.7  28.7
## Survey_occupancy   0.0   0.0 45.0 22.50   0.0 45.0   0.0 22.50   0.0   0.0
## CV residual      -28.7 -28.7 16.3 -6.19 -28.7 16.3 -28.7 -6.19 -28.7 -28.7
##                    164  178  179  186  188  192   196   201   209  212
## Predicted         28.0 28.0 28.0 28.0 28.0 28.0  28.0  28.0  28.0 28.0
## cvpred            28.7 28.7 28.7 28.7 28.7 28.7  28.7  28.7  28.7 28.7
## Survey_occupancy 40.0 40.0 40.0 40.0 80.0 40.0   0.0   0.0   0.0 40.0
## CV residual       11.3 11.3 11.3 11.3 51.3 11.3 -28.7 -28.7 -28.7 11.3
##                     215
## Predicted          28.0
## cvpred             28.7
## Survey_occupancy   0.0
## CV residual      -28.7
##
## Sum of squares = 12241    Mean square = 583    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97  115   116
## Predicted         28.01 28.01 28.01 28.01  28.0 28.01 28.01 28.0 28.0  28.0
## cvpred            27.56 27.56 27.56 27.56  27.6 27.56 27.56 27.6 27.6  27.6
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0 22.50 22.50 67.5 67.5   0.0
## CV residual      -5.06 -5.06 -5.06 -5.06 -27.6 -5.06 -5.06 39.9 39.9 -27.6
##                     119  124  152   160  163  177   187  193  194  198
## Predicted          28.0 28.0 28.0  28.0 28.0 28.0  28.0 28.0 28.0 28.0
## cvpred             27.6 27.6 27.6  27.6 27.6 27.6  27.6 27.6 27.6 27.6
## Survey_occupancy   0.0 45.0 80.0   0.0 80.0 40.0   0.0 40.0 40.0 80.0
## CV residual      -27.6 17.4 52.4 -27.6 52.4 12.4 -27.6 12.4 12.4 52.4
##                     216
## Predicted          28.0
## cvpred             27.6
## Survey_occupancy   0.0
## CV residual      -27.6
##
## Sum of squares = 16919    Mean square = 806    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23    31    36    39    44   46    50    59
## Predicted         28.0 28.01  28.0 28.01  28.0 28.01  28.0 28.0 28.01 28.01
## cvpred            28.1 28.09  28.1 28.09  28.1 28.09  28.1 28.1 28.09 28.09
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual      16.9 -5.59 -28.1 -5.59 -28.1 -5.59 -28.1 39.4 -5.59 -5.59
##                     65    78    88   113   133  150   155  161   180  181
## Predicted         28.01  28.0  28.0 28.01 28.01 28.0  28.0 28.0  28.0 28.0
## cvpred            28.09  28.1  28.1 28.09 28.09 28.1  28.1 28.1  28.1 28.1
## Survey_occupancy 22.50   0.0   0.0 22.50 22.50 40.0   0.0 80.0   0.0 80.0
## CV residual      -5.59 -28.1 -28.1 -5.59 -5.59 11.9 -28.1 51.9 -28.1 51.9
##                    183
## Predicted         28.0
## cvpred            28.1
## Survey_occupancy 80.0
```

```
## CV residual      51.9
##
## Sum of squares = 15838    Mean square = 754    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 711
```

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##                    Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs   1  80101   80101     238 <2e-16 ***
## Residuals         214  71881     336
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6     24   25   28    34    35     56   67
## Wifi_Average_logs   2.42  2.27 21.833 10.9 14.2  37.1 14.91   5.55 20.8
## cvpred              8.06  7.96 21.875 14.1 16.4  32.7 16.95  10.29 21.1
## Survey_occupancy    0.00  0.00 22.500 22.5 45.0  22.5 22.50   0.00 45.0
## CV residual        -8.06 -7.96  0.625  8.4 28.6 -10.2  5.55 -10.29 23.9
##                       72     80     89   90    94   105   108   112    138
## Wifi_Average_logs   8.25   6.36   5.17 28.4 25.08 27.0 25.33  17.5   9.25
## cvpred             12.21  10.87  10.02 26.5 24.19 25.6 24.37  18.8  12.92
## Survey_occupancy   22.50   0.00   0.00 45.0 22.50 45.0 22.50   0.0   0.00
## CV residual        10.29 -10.87 -10.02 18.5 -1.69 19.4 -1.87 -18.8 -12.92
```

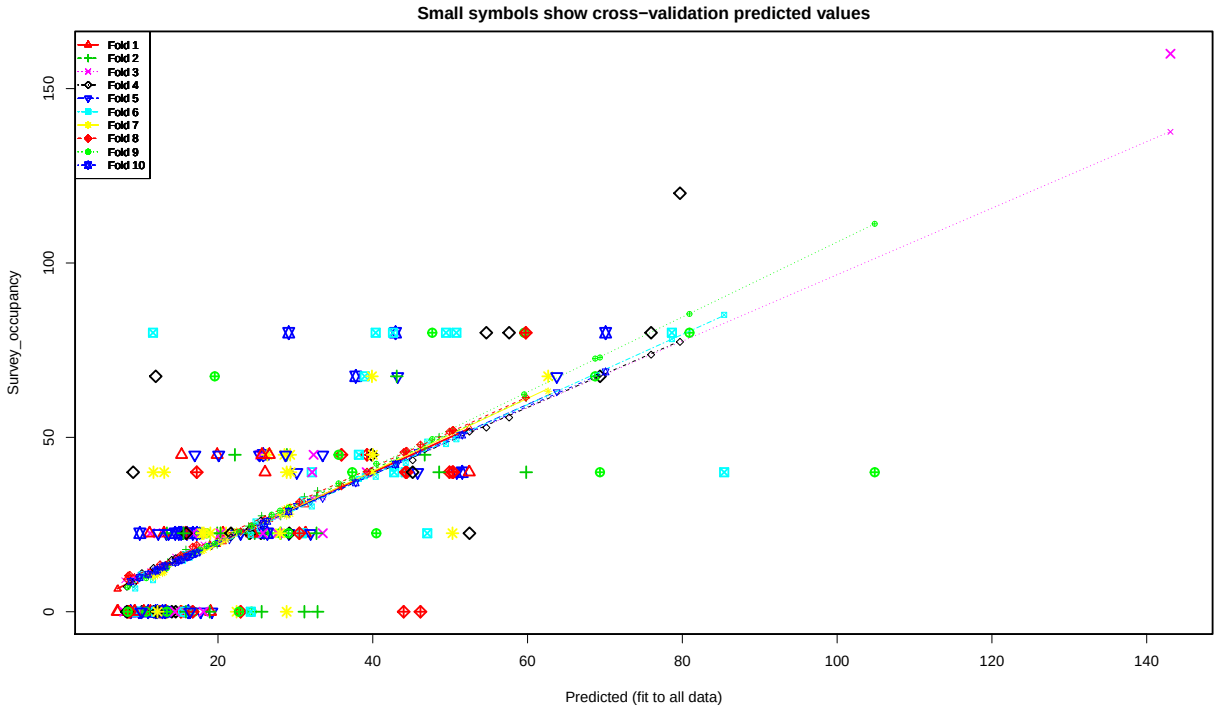
```
##                     149   165   211
## Wifi_Average_logs 25.5  63.3  1.42
## cvpred            24.5  51.4  7.35
## Survey_occupancy  40.0  40.0  0.00
## CV residual       15.5 -11.4 -7.35
##
## Sum of squares = 3822    Mean square = 182    n = 21
##
## fold 2
## Observations in test set: 22
##                      12    21    22     30    42    49   76   81    96
## Wifi_Average_logs 33.6 32.50 17.50 20.750 11.45 29.43 25.7 22.0 57.08
## cvpred            30.9 30.09 19.36 21.682 15.03 27.89 25.2 22.6 47.67
## Survey_occupancy  45.0 22.50 22.50 22.500 22.50 22.50 22.5 45.0 45.00
## CV residual       14.1 -7.59  3.14  0.818  7.47 -5.39 -2.7 22.4 -2.67
##                     117  121  123   125   135    136   140   148   171
## Wifi_Average_logs  17.3 51.9 24.5 19.33  37.1   9.58 12.50  10.9  32.8
## cvpred             19.2 44.0 24.4 20.67  33.4  13.69 15.78  14.6  30.3
## Survey_occupancy    0.0 67.5 22.5 22.50  22.5   0.00 22.50   0.0   0.0
## CV residual       -19.2 23.5 -1.9  1.83 -10.9 -13.69  6.72 -14.6 -30.3
##                     189   190   199   205
## Wifi_Average_logs  24.9  73.8 57.73  35.2
## cvpred             24.7  59.6 48.13  32.1
## Survey_occupancy    0.0  40.0 40.00   0.0
## CV residual       -24.7 -19.6 -8.13 -32.1
##
## Sum of squares = 5371    Mean square = 244    n = 22
##
## fold 3
## Observations in test set: 22
##                        1     2      8     13   19    20    40   48   54
## Wifi_Average_logs   4.75 13.45   5.82   5.25 28.7  8.36 10.86 31.9 17.7
## cvpred             10.71 16.63  11.44  11.05 27.0 13.17 14.87 29.2 19.5
## Survey_occupancy    0.00 22.50   0.00   0.00 45.0 22.50 22.50 22.5 22.5
## CV residual       -10.71  5.87 -11.44 -11.05 18.0  9.33  7.63 -6.7  3.0
##                       55    73    79    83    87   95   100   131   147
## Wifi_Average_logs  40.3  2.58  1.55 14.17  12.9 36.5 19.33 27.17 192.9
## cvpred             34.9  9.24  8.53 17.12  16.3 32.4 20.64 25.97 138.8
## Survey_occupancy   22.5  0.00  0.00 22.50   0.0 45.0 22.50 22.50 160.0
## CV residual       -12.4 -9.24 -8.53  5.38 -16.3 12.6  1.86 -3.47  21.2
##                     167   174   182    191
## Wifi_Average_logs 34.3 44.33  14.2   8.92
## cvpred            30.8 37.65  17.1  13.55
## Survey_occupancy  40.0 40.00   0.0   0.00
## CV residual        9.2  2.35 -17.1 -13.55
##
## Sum of squares = 2722    Mean square = 124    n = 22
##
## fold 4
## Observations in test set: 22
##                        3    11    17    18    27    45    57    69    82
## Wifi_Average_logs   6.83 14.42 28.83   9.0  12.4  13.1 49.33 34.08  7.36
## cvpred             11.38 16.61 26.56  12.9  15.2  15.7 40.72 30.19 11.74
## Survey_occupancy    0.00 22.50 22.50   0.0   0.0   0.0 45.00 22.50 67.50
```

```
## CV residual       -11.38  5.89 -4.06 -12.9 -15.2 -15.7  4.28 -7.69 55.76
##                     103   107    110   127   134   145   154  195  203
## Wifi_Average_logs 24.75  65.4 89.500 21.27 13.00 102.2 96.91 66.5 70.7
## cvpred            23.75  51.8 68.446 21.34 15.63  77.2 73.56 52.5 55.4
## Survey_occupancy  22.50  22.5 67.500 22.50 22.50 120.0 80.00 80.0 80.0
## CV residual       -1.25 -29.3 -0.946  1.16  6.87  42.8  6.44 27.5 24.6
##                     204   206    208   210
## Wifi_Average_logs 52.83  1.17   5.58  0.00
## cvpred            43.13  7.46  10.51  6.66
## Survey_occupancy  40.00 40.00   0.00  0.00
## CV residual       -3.13 32.54 -10.51 -6.66
##
## Sum of squares = 9368    Mean square = 426    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33      47   53   60    70    75    86   91
## Wifi_Average_logs 11.36 34.00 23.0000 28.6 40.2 25.08  15.7 36.00 52.1
## cvpred            14.21 30.31 22.4869 26.5 34.8 23.97  17.3 31.73 43.2
## Survey_occupancy  22.50 22.50 22.5000 45.0 45.0 22.50   0.0 22.50 67.5
## CV residual        8.29 -7.81  0.0131 18.5 10.2 -1.47 -17.3 -9.23 24.3
##                      92    98   106   114  118  139   141  142  158   168
## Wifi_Average_logs  17.7  7.83 81.50  9.73 31.4 14.6  4.25 19.0 31.4 53.75
## cvpred             18.7 11.70 64.09 13.05 28.4 16.5  9.15 19.6 28.5 44.35
## Survey_occupancy    0.0 22.50 67.50 22.50 45.0 45.0  0.00 45.0 40.0 40.00
## CV residual       -18.7 10.80  3.41  9.45 16.6 28.5 -9.15 25.4 11.5 -4.35
##                     176   202   213
## Wifi_Average_logs 61.00  11.7  2.67
## cvpred            49.51  14.4  8.03
## Survey_occupancy  40.00   0.0  0.00
## CV residual       -9.51 -14.4 -8.03
##
## Sum of squares = 4453    Mean square = 202    n = 22
##
## fold 6
## Observations in test set: 22
##                       5      9    61    62    64   85   126   128    137
## Wifi_Average_logs 14.73   6.75 27.83  59.6 36.42 46.0 44.92  13.6   7.45
## cvpred            16.33  10.60 25.76  48.6 31.94 38.8 38.05  15.5  11.10
## Survey_occupancy  22.50   0.00 22.50  22.5 22.50 67.5 45.00   0.0   0.00
## CV residual        6.17 -10.60 -3.26 -26.1 -9.44 28.7  6.95 -15.5 -11.10
##                     143   151   156  157   159   169   170    172  173
## Wifi_Average_logs  12.4  22.9 34.18 59.0 110.4 51.55 49.42 100.75 60.9
## cvpred             14.7  22.2 30.33 48.2  85.2 42.82 41.29  78.22 49.6
## Survey_occupancy    0.0   0.0 40.00 80.0  40.0 40.00 40.00  80.00 80.0
## CV residual       -14.7 -22.2  9.67 31.8 -45.2 -2.82 -1.29   1.78 30.4
##                     184  197   200   207
## Wifi_Average_logs 49.2 46.0  1.55  4.83
## cvpred            41.1 38.8  6.85  9.22
## Survey_occupancy  80.0 80.0  0.00 80.00
## CV residual       38.9 41.2 -6.85 70.78
##
## Sum of squares = 15224    Mean square = 692    n = 22
##
```

```
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68 77    93    99   101
## Wifi_Average_logs  24.3 33.2  14.2 34.2  33.6  64.2 28 19.40 20.36 79.91
## cvpred             23.4 29.8  16.1 30.5  30.1  52.1 26 19.85 20.54 63.39
## Survey_occupancy    0.0 45.0   0.0 45.0   0.0  22.5 45 22.50 22.50 67.50
## CV residual       -23.4 15.2 -16.1 14.5 -30.1 -29.6 19  2.65  1.96  4.11
##                      104   111   120  130   132   144  146    153  166
## Wifi_Average_logs 47.50 30.33 17.45 47.3 15.92 16.25 29.5   6.58 30.2
## cvpred            40.07 27.72 18.45 39.9 17.34 17.58 27.1  10.63 27.7
## Survey_occupancy  45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.00 40.0
## CV residual        4.93 -5.22  4.05 27.6  5.16  4.92 12.9 -10.63 12.3
##                      175   185   214
## Wifi_Average_logs  4.92  6.91  5.67
## cvpred             9.43 10.86  9.97
## Survey_occupancy  40.00 40.00  0.00
## CV residual       30.57 29.14 -9.97
##
## Sum of squares = 6609    Mean square = 300    n = 22
##
## fold 8
## Observations in test set: 21
##                       16    38    51    63    74  102   109   122    129
## Wifi_Average_logs  11.3  25.1 43.73 15.08  2.09 46.4  12.0 33.92   8.17
## cvpred             15.3  25.1 38.47 17.95  8.65 40.4  15.7 31.44  13.00
## Survey_occupancy    0.0   0.0 45.00 22.50  0.00 45.0   0.0 22.50   0.00
## CV residual       -15.3 -25.1  6.53  4.55 -8.65  4.6 -15.7 -8.94 -13.00
##                      162   164   178   179  186  188   192   196   201
## Wifi_Average_logs  54.3 59.64  60.3 51.55 51.7 73.8  60.2  12.2  0.25
## cvpred             46.0 49.87  50.4 44.07 44.2 60.0  50.3  15.9  7.33
## Survey_occupancy    0.0 40.00  40.0 40.00 40.0 80.0  40.0   0.0  0.00
## CV residual       -46.0 -9.87 -10.4 -4.07 -4.2 20.0 -10.3 -15.9 -7.33
##                      209  212   215
## Wifi_Average_logs  0.545 12.9  51.2
## cvpred             7.538 16.4  43.8
## Survey_occupancy   0.000 40.0   0.0
## CV residual       -7.538 23.6 -43.8
##
## Sum of squares = 7221    Mean square = 344    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97   115
## Wifi_Average_logs 30.83 17.58 32.36 18.80  16.4  50.2 31.91 18.3 88.60
## cvpred            29.01 18.86 30.18 19.79  18.0  43.8 29.83 19.4 73.26
## Survey_occupancy  22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.50
## CV residual       -6.51  3.64 -7.68  2.71 -18.0 -21.3 -7.33 48.1 -5.76
##                      116   119   124  152   160  163   177   187   193
## Wifi_Average_logs  25.1  22.8 41.17 73.5  3.58 56.5  87.5   7.4 138.2
## cvpred             24.6  22.8 36.92 61.7  8.13 48.6  72.4  11.1 111.3
## Survey_occupancy    0.0   0.0 45.00 80.0  0.00 80.0  40.0   0.0  40.0
## CV residual       -24.6 -22.8  8.08 18.3 -8.13 31.4 -32.4 -11.1 -71.3
##                      194    198    216
## Wifi_Average_logs 41.67 104.00  0.167
```

```
## cvpred            37.31  85.06  5.517
## Survey_occupancy  40.00  80.00  0.000
## CV residual        2.69  -5.06 -5.517
##
## Sum of squares = 12195    Mean square = 581    n = 21
##
## fold 10
## Observations in test set: 21
##                      10    14     23    31    36    39  44   46    50    59
## Wifi_Average_logs 29.3 16.25   9.36 14.08  15.4 13.67   8 46.4 13.00 15.17
## cvpred            26.8 17.74  12.94 16.23  17.2 15.94  12 38.7 15.47 16.98
## Survey_occupancy  45.0 22.50   0.00 22.50   0.0 22.50   0 67.5 22.50 22.50
## CV residual       18.2  4.76 -12.94  6.27 -17.2  6.56 -12 28.8  7.03  5.52
##                      65    78     88   113   133   150    155  161    180
## Wifi_Average_logs 17.00  2.73   7.67 28.00  4.42 62.00   7.08 29.9   6.58
## cvpred            18.26  8.32  11.76 25.92  9.49 49.61  11.35 27.3  11.00
## Survey_occupancy  22.50  0.00   0.00 22.50 22.50 40.00   0.00 80.0   0.00
## CV residual        4.24 -8.32 -11.76 -3.42 13.01 -9.61 -11.35 52.7 -11.00
##                     181  183
## Wifi_Average_logs 49.7 88.5
## cvpred            41.0 68.1
## Survey_occupancy  80.0 80.0
## CV residual       39.0 11.9
##
## Sum of squares = 7143    Mean square = 340    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 343


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                    Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs   1  80101   80101  238.22 <2e-16 ***
## Room                1    260     260    0.77   0.38
## Residuals         213  71621     336
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                       4     6    24   25   28    34    35    56   67   72
## Predicted          7.08  6.98 20.65 13.0 15.3 31.31 15.81  9.27 19.9 11.2
## cvpred             6.57  6.47 20.05 12.5 14.7 30.63 15.24  8.74 19.3 10.6
## Survey_occupancy   0.00  0.00 22.50 22.5 45.0 22.50 22.50  0.00 45.0 22.5
## CV residual       -6.57 -6.47  2.45 10.0 30.3 -8.13  7.26 -8.74 25.7 11.9
##                      80    89   90    94  105  108 112   138  149   165
## Predicted          11.3  10.4 26.6 24.34 25.7 24.5  19  13.3 26.1  52.5
## cvpred             11.2  10.4 26.5 24.23 25.6 24.4  19  13.2 26.5  52.7
## Survey_occupancy    0.0   0.0 45.0 22.50 45.0 22.5   0   0.0 40.0  40.0
## CV residual       -11.2 -10.4 18.5 -1.73 19.4 -1.9 -19 -13.2 13.5 -12.7
##                     211
## Predicted          9.22
## cvpred             9.73
## Survey_occupancy   0.00
## CV residual       -9.73
##
## Sum of squares = 4040    Mean square = 192    n = 21
##
## fold 2
## Observations in test set: 22
##                       12    21    22    30   42    49    76   81   96   117
## Predicted          28.9 28.11 17.62 19.90 13.4 25.96 24.75 22.2 46.7  18.9
## cvpred             28.1 27.33 16.98 19.22 12.8 25.21 25.32 22.8 47.0  19.6
## Survey_occupancy 45.0 22.50 22.50 22.50 22.5 22.50 22.50 45.0 45.0   0.0
## CV residual        16.9 -4.83  5.52  3.28  9.7 -2.71 -2.82 22.2 -2.0 -19.6
##                     121   123   125   135   136   140   148   171   189
## Predicted          43.1 23.97 20.32  32.7  13.5 15.55  15.9  31.2  25.6
```

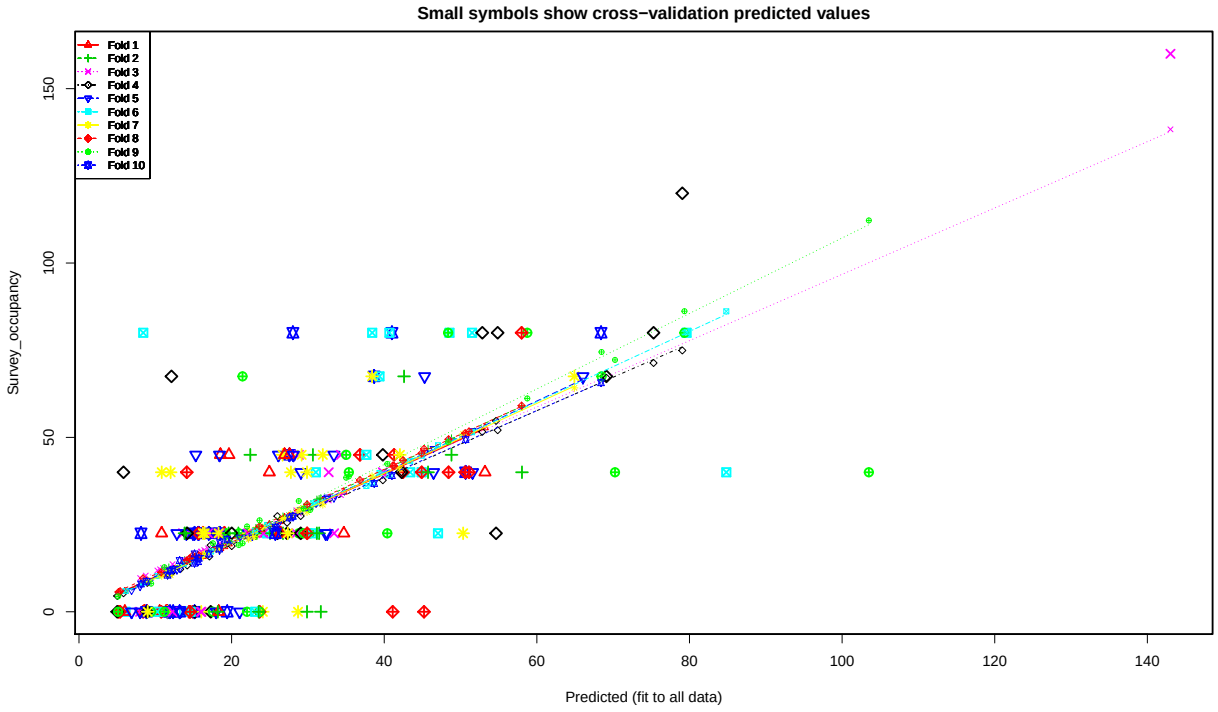
```
## cvpred           43.4 24.54 20.95  33.2  14.2 16.23  17.8  33.0  27.5
## Survey_occupancy 67.5 22.50 22.50  22.5   0.0 22.50   0.0   0.0   0.0
## CV residual      24.1 -2.04  1.55 -10.7 -14.2  6.27 -17.8 -33.0 -27.5
##                    190   199   205
## Predicted         59.8  48.6  32.9
## cvpred            61.3  50.1  34.6
## Survey_occupancy  40.0  40.0   0.0
## CV residual      -21.3 -10.1 -34.6
##
## Sum of squares = 6197    Mean square = 282    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     8    13   19   20   40    48   54    55
## Predicted         8.71 14.80  9.46  9.06 25.5 11.2 13.0 27.70 17.7  33.5
## cvpred            9.25 15.02  9.96  9.58 25.1 11.6 13.3 27.23 17.8  32.8
## Survey_occupancy  0.00 22.50  0.00  0.00 45.0 22.5 22.5 22.50 22.5  22.5
## CV residual      -9.25  7.48 -9.96 -9.58 19.9 10.9  9.2 -4.73  4.7 -10.3
##                     73    79    83    87   95  100   131   147   167
## Predicted         8.62  7.89 16.71  15.8 32.4 20.3 25.80 143.1 32.18
## cvpred            9.71  9.02 17.38  16.6 32.2 20.8 25.99 137.6 32.58
## Survey_occupancy  0.00  0.00 22.50   0.0 45.0 22.5 22.50 160.0 40.00
## CV residual      -9.71 -9.02  5.12 -16.6 12.8  1.7 -3.49  22.4  7.42
##                    174   182   191
## Predicted        39.215  18.1  14.5
## cvpred           39.244  19.3  15.8
## Survey_occupancy 40.000   0.0   0.0
## CV residual       0.756 -19.3 -15.8
##
## Sum of squares = 2913    Mean square = 132    n = 22
##
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45    57    69   82
## Predicted         10.2 15.47 25.55  11.7  14.0  14.5 39.88 29.22 12.0
## cvpred            11.1 16.27 26.16  12.5  14.9  15.4 40.24 29.77 11.8
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.00 22.50 67.5
## CV residual      -11.1  6.23 -3.66 -12.5 -14.9 -15.4  4.76 -7.27 55.7
##                    103   107    110   127  134   145   154  195  203   204
## Predicted        24.11  52.5 69.368 21.68 15.9  79.7 75.96 54.7 57.6 45.16
## cvpred           23.76  51.6 68.216 21.38 15.7  77.4 73.71 52.8 55.7 43.45
## Survey_occupancy 22.50  22.5 67.500 22.50 22.5 120.0 80.00 80.0 80.0 40.00
## CV residual      -1.26 -29.1 -0.716  1.12  6.8  42.6  6.29 27.2 24.3 -3.45
##                    206   208   210
## Predicted         9.04  12.1  8.23
## cvpred            7.98  11.0  7.18
## Survey_occupancy 40.00   0.0  0.00
## CV residual      32.02 -11.0 -7.18
##
## Sum of squares = 9260    Mean square = 421    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53   60     70    75    86   91    92
```

```
## Predicted        13.34 29.16 21.47 25.4 33.5 22.925  17.8 31.97 43.2  19.2
## cvpred           12.57 28.22 20.61 24.5 32.5 22.054  17.6 31.61 42.7  19.0
## Survey_occupancy 22.50 22.50 22.50 45.0 45.0 22.500   0.0 22.50 67.5   0.0
## CV residual       9.93 -5.72  1.89 20.5 12.5  0.446 -17.6 -9.11 24.8 -19.0
##                    98   106   114  118  139   141  142   158  168   176
## Predicted        12.3 63.78 13.61 28.7 17.0  9.78 20.1 30.19 45.8  50.9
## cvpred           12.1 63.06 13.46 28.4 16.8  9.67 19.9 30.46 45.9  50.9
## Survey_occupancy 22.5 67.50 22.50 45.0 45.0  0.00 45.0 40.00 40.0  40.0
## CV residual      10.4  4.44  9.04 16.6 28.2 -9.67 25.1  9.54 -5.9 -10.9
##                    202   213
## Predicted         16.4  10.1
## cvpred            16.8  10.6
## Survey_occupancy   0.0   0.0
## CV residual      -16.8 -10.6
##
## Sum of squares = 4720    Mean square = 215    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9   61    62    64   85   126   128   137   143
## Predicted        15.69  10.1 24.8  47.0 30.85 39.0 38.21  16.3  12.0  15.5
## cvpred           16.45  10.7 25.9  48.8 32.08 38.8 38.07  15.5  11.1  14.6
## Survey_occupancy 22.50   0.0 22.5  22.5 22.50 67.5 45.00   0.0   0.0   0.0
## CV residual       6.05 -10.7 -3.4 -26.3 -9.58 28.7  6.93 -15.5 -11.1 -14.6
##                    151   156  157   159   169   170   172  173  184  197
## Predicted         24.2 32.12 49.5  85.4 44.26 42.77 78.65 50.8 42.6 40.4
## cvpred            22.1 30.19 48.1  85.1 42.71 41.17 78.17 49.5 41.0 38.7
## Survey_occupancy   0.0 40.00 80.0  40.0 40.00 40.00 80.00 80.0 80.0 80.0
## CV residual      -22.1  9.81 31.9 -45.1 -2.71 -1.17  1.83 30.5 39.0 41.3
##                    200   207
## Predicted         9.31 11.61
## cvpred            6.67  9.04
## Survey_occupancy  0.00 80.00
## CV residual      -6.67 70.96
##
## Sum of squares = 15281    Mean square = 695    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99  101
## Predicted         22.4 28.6  15.4 29.3  28.9  50.3 26.4 20.37 21.04 62.7
## cvpred            23.1 29.4  15.9 30.2  29.7  51.7 26.0 19.89 20.58 63.2
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.5
## CV residual      -23.1 15.6 -15.9 14.8 -29.7 -29.2 19.0  2.61  1.92  4.3
##                    104   111  120  130  132   144  146   153  166   175
## Predicted        40.01 28.01 19.0 39.9 17.9 18.17 28.9  12.8 29.4 11.66
## cvpred           40.01 27.72 18.5 39.9 17.4 17.64 27.5  11.1 28.0  9.87
## Survey_occupancy 45.00 22.50 22.5 67.5 22.5 22.50 40.0   0.0 40.0 40.00
## CV residual       4.99 -5.22  4.0 27.6  5.1  4.86 12.5 -11.1 12.0 30.13
##                    185   214
## Predicted         13.1  12.2
## cvpred            11.3  10.4
## Survey_occupancy  40.0   0.0
## CV residual       28.7 -10.4
```

```
##
## Sum of squares = 6510    Mean square = 296    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51    63    74   102   109   122   129
## Predicted         13.3  22.9 35.96 15.94  8.27 39.25  15.2 30.52  12.5
## cvpred            13.5  23.0 35.98 16.07  9.33 40.14  16.2 31.46  13.6
## Survey_occupancy   0.0   0.0 45.00 22.50  0.00 45.00   0.0 22.50   0.0
## CV residual      -13.5 -23.0  9.02  6.43 -9.33  4.86 -16.2 -8.96 -13.6
##                     162   164   178  179   186  188   192   196   201
## Predicted         46.2  49.9  50.4 44.3 44.38 59.8  50.3  16.7   8.4
## cvpred            47.9  51.6  52.1 46.0 46.13 61.4  52.0  18.6  10.4
## Survey_occupancy   0.0  40.0  40.0 40.0 40.00 80.0  40.0   0.0   0.0
## CV residual      -47.9 -11.6 -12.1 -6.0 -6.13 18.6 -12.0 -18.6 -10.4
##                     209  212   215
## Predicted          8.61 17.3  44.0
## cvpred            10.56 19.2  45.7
## Survey_occupancy   0.00 40.0   0.0
## CV residual      -10.56 20.8 -45.7
##
## Sum of squares = 7703    Mean square = 367    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97   115
## Predicted          26.94 17.68 28.01 18.53  16.9  40.5 29.11 19.6 68.74
## cvpred             27.83 17.83 28.99 18.75  17.0  42.4 29.82 19.5 72.59
## Survey_occupancy   22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.50
## CV residual        -5.33  4.67 -6.49  3.75 -17.0 -19.9 -7.32 48.0 -5.09
##                     116   119  124  152   160  163   177   187   193   194
## Predicted          24.3  22.7 35.6 59.6 10.73 47.7  69.4  13.4 104.9 37.35
## cvpred             24.7  22.9 36.8 62.3  9.62 49.5  72.9  12.5 111.2 38.35
## Survey_occupancy    0.0   0.0 45.0 80.0  0.00 80.0  40.0   0.0  40.0 40.00
## CV residual       -24.7 -22.9  8.2 17.7 -9.62 30.5 -32.9 -12.5 -71.2  1.65
##                     198   216
## Predicted          80.92  8.34
## cvpred             85.39  7.04
## Survey_occupancy   80.00  0.00
## CV residual        -5.39 -7.04
##
## Sum of squares = 12100    Mean square = 576    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23   31    36    39    44   46    50    59
## Predicted          25.9 16.75  11.9 15.2  16.2 14.95  11.0 37.8 14.48 15.99
## cvpred             25.3 16.38  11.7 14.9  15.8 14.61  10.7 36.9 14.16 15.64
## Survey_occupancy   45.0 22.50   0.0 22.5   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual        19.7  6.12 -11.7  7.6 -15.8  7.89 -10.7 30.6  8.34  6.86
##                       65    78    88   113   133   150   155  161   180  181
## Predicted          17.27  8.72  12.2 26.38  9.90  51.6  13.2 29.1  12.8 42.9
## cvpred             16.89  8.66  12.0 25.92  9.81  50.7  13.2 28.8  12.8 42.2
## Survey_occupancy   22.50  0.00   0.0 22.50 22.50  40.0   0.0 80.0   0.0 80.0
```

```
## CV residual       5.61 -8.66 -12.0 -3.42 12.69 -10.7 -13.2 51.2 -12.8 37.8
##                    183
## Predicted         70.1
## cvpred            68.8
## Survey_occupancy  80.0
## CV residual       11.2
##
## Sum of squares = 7151    Mean square = 341    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 351

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  80101   80101  236.31 <2e-16 ***
## Factor_Time          3    359     120    0.35   0.79
## Residuals          211  71522     339
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                       4     6    24    25   28    34    35    56   67   72
## Predicted          8.63  8.53 23.94 16.24 18.5  34.7 19.06  8.92 19.7 10.8
## cvpred             8.79  8.69 23.54 15.85 18.1  34.3 18.66  8.73 19.4 10.6
## Survey_occupancy   0.00  0.00 22.50 22.50 45.0  22.5 22.50  0.00 45.0 22.5
```

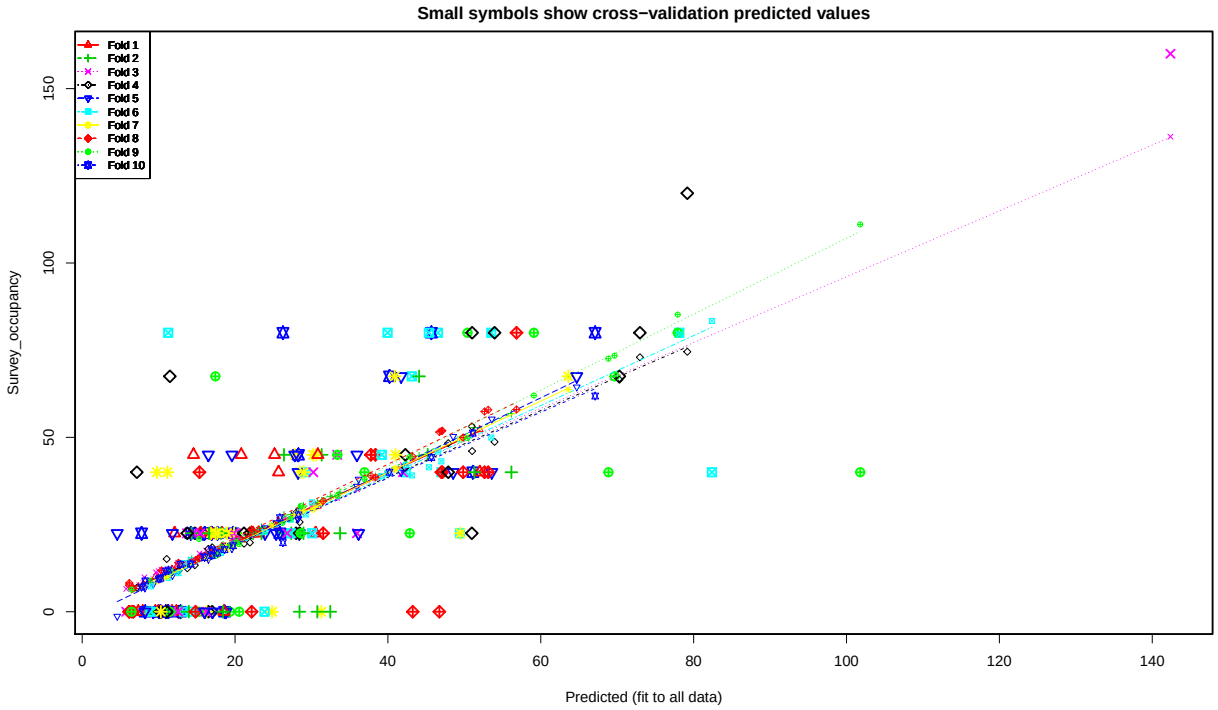
```
## CV residual      -8.79 -8.69 -1.04  6.65 26.9 -11.8  3.84 -8.73 25.6 11.9
##                    80    89   90    94  105   108   112   138  149   165
## Predicted         11.4  10.6 26.9 26.24 27.6 26.41  18.3  11.5 24.9  53.2
## cvpred            11.6  10.7 27.1 25.83 27.2 26.01  18.7  11.3 25.1  52.7
## Survey_occupancy   0.0   0.0 45.0 22.50 45.0 22.50   0.0   0.0 40.0  40.0
## CV residual      -11.6 -10.7 17.9 -3.33 17.8 -3.51 -18.7 -11.3 14.9 -12.7
##                   211
## Predicted         6.01
## cvpred            5.82
## Survey_occupancy  0.00
## CV residual      -5.82
##
## Sum of squares = 3752    Mean square = 179    n = 21
##
## fold 2
## Observations in test set: 22
##                     12    21    22    30    42    49    76   81    96   117
## Predicted        30.7 31.47 20.89 23.18 14.05 26.73 25.03 22.4 48.81  18.2
## cvpred           30.3 32.35 21.73 24.03 14.61 27.34 24.63 22.0 49.75  18.8
## Survey_occupancy 45.0 22.50 22.50 22.50 22.50 22.50 22.50 45.0 45.00   0.0
## CV residual      14.7 -9.85  0.77 -1.53  7.89 -4.84 -2.13 23.0 -4.75 -18.8
##                   121   123   125   135   136   140   148   171   189
## Predicted        42.6 23.29 19.61 31.17  11.8 13.83  14.6  31.7  23.5
## cvpred           43.3 23.88 20.19 32.18  12.7 14.78  14.2  32.6  24.1
## Survey_occupancy 67.5 22.50 22.50 22.50   0.0 22.50   0.0   0.0   0.0
## CV residual      24.2 -1.38  2.31 -9.68 -12.7  7.72 -14.2 -32.6 -24.1
##                   190   199   205
## Predicted         58.0 45.74  29.9
## cvpred            58.8 46.79  30.9
## Survey_occupancy  40.0 40.00   0.0
## CV residual      -18.8 -6.79 -30.9
##
## Sum of squares = 5416    Mean square = 246    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     8    13   19    20    40   48    54    55
## Predicted         10.3 16.42  11.0  10.6 28.8 14.44 13.63 28.5 18.43  33.4
## cvpred            11.8 17.68  12.6  12.2 28.2 14.51 14.95 29.1 19.53  33.0
## Survey_occupancy   0.0 22.50   0.0   0.0 45.0 22.50 22.50 22.5 22.50  22.5
## CV residual      -11.8  4.82 -12.6 -12.2 16.8  7.99  7.55 -6.6  2.97 -10.5
##                     73    79    83    87   95    100   131   147   167
## Predicted          8.75  8.02 16.92  16.0 34.3 22.181 24.18 143.0 32.72
## cvpred            10.38  9.68 18.16  17.3 33.5 21.882 24.23 138.3 31.93
## Survey_occupancy   0.00  0.00 22.50   0.0 45.0 22.500 22.50 160.0 40.00
## CV residual      -10.38 -9.68  4.34 -17.3 11.5  0.618 -1.73  21.7  8.07
##                   174   182   191
## Predicted        39.82  16.0  12.3
## cvpred           38.69  17.2  13.6
## Survey_occupancy 40.00   0.0   0.0
## CV residual       1.31 -17.2 -13.6
##
## Sum of squares = 2710    Mean square = 123    n = 22
##
```

```
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45    57    69   82
## Predicted         11.7 17.10 27.27  13.3  17.3  15.2 39.82 29.06 12.1
## cvpred            10.7 15.85 25.54  12.2  19.1  15.7 37.71 27.46 11.1
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.00 22.50 67.5
## CV residual      -10.7  6.65 -3.04 -12.2 -19.1 -15.7  7.29 -4.96 56.4
##                     103   107  110   127   134   145   154  195  203
## Predicted         26.00  54.7 69.1 20.02 14.18  79.1 75.29 52.9 54.9
## cvpred            27.42  54.7 67.1 18.84 13.27  74.9 71.34 51.6 52.1
## Survey_occupancy 22.50  22.5 67.5 22.50 22.50 120.0 80.00 80.0 80.0
## CV residual      -4.92 -32.2  0.4  3.66  9.23  45.1  8.66 28.4 27.9
##                       204   206   208   210
## Predicted         42.2851  5.83  8.95  5.01
## cvpred            40.0693  5.31  8.29  4.53
## Survey_occupancy 40.0000 40.00  0.00  0.00
## CV residual      -0.0693 34.69 -8.29 -4.53
##
## Sum of squares = 10335    Mean square = 470    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53   60     70    75    86   91    92
## Predicted         14.94  32.5 22.20 26.1 33.4 22.707  18.0  32.3 45.3  21.0
## cvpred            15.13  32.9 21.28 25.2 32.6 21.866  18.2  32.5 45.7  21.4
## Survey_occupancy 22.50  22.5 22.50 45.0 45.0 22.500   0.0  22.5 67.5   0.0
## CV residual       7.37 -10.4  1.22 19.8 12.4  0.634 -18.2 -10.0 21.8 -21.4
##                      98  106  114  118  139   141  142  158   168   176
## Predicted         14.07 66.0 12.8 28.1 15.3  8.01 18.4 29.1 46.46  51.6
## cvpred            14.43 66.4 11.9 27.2 14.5  7.17 17.6 29.3 46.82  51.9
## Survey_occupancy 22.50 67.5 22.5 45.0 45.0  0.00 45.0 40.0 40.00  40.0
## CV residual       8.07  1.1 10.6 17.8 30.5 -7.17 27.4 10.7 -6.82 -11.9
##                     202   213
## Predicted         13.2  6.89
## cvpred            12.4  6.05
## Survey_occupancy   0.0  0.00
## CV residual      -12.4 -6.05
##
## Sum of squares = 4802    Mean square = 218    n = 22
##
## fold 6
## Observations in test set: 22
##                       5     9   61    62    64   85   126   128   137   143
## Predicted         17.31  11.7 24.6  47.0 30.70 39.4 37.66  14.6  10.3  13.8
## cvpred            17.29  11.5 24.9  47.8 31.08 39.8 36.07  14.7  10.2  13.8
## Survey_occupancy 22.50   0.0 22.5  22.5 22.50 67.5 45.00   0.0   0.0   0.0
## CV residual       5.21 -11.5 -2.4 -25.3 -8.58 27.7  8.93 -14.7 -10.2 -13.8
##                     151   156  157   159   169   170    172  173  184  197
## Predicted         23.1 31.04 48.5  84.8 44.91 43.40 79.620 51.5 40.7 38.4
## cvpred            23.2 31.29 49.1  86.2 44.75 43.21 80.155 51.5 39.2 36.8
## Survey_occupancy   0.0 40.00 80.0  40.0 40.00 40.00 80.000 80.0 80.0 80.0
## CV residual      -23.2  8.71 30.9 -46.2 -4.75 -3.21 -0.155 28.5 40.8 43.2
##                     200   207
## Predicted         6.10  8.42
```

```
## cvpred            5.98  8.35
## Survey_occupancy  0.00 80.00
## CV residual      -5.98 71.65
##
## Sum of squares = 15477    Mean square = 703    n = 22
##
## fold 7
## Observations in test set: 22
##                      15   29    37   58    66    68   77    93     99  101
## Predicted         24.1 32.0  16.0 29.2  28.7  50.3 26.7 22.23 22.907 64.9
## cvpred            24.2 30.7  15.5 29.5  29.0  51.0 26.8 20.83 21.524 64.2
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.500 67.5
## CV residual      -24.2 14.3 -15.5 15.5 -29.0 -28.5 18.2  1.67  0.976  3.3
##                     104   111   120  130   132  144  146   153  166  175
## Predicted         42.05 27.37 18.28 38.4 16.24 16.5 27.8  11.6 29.9 12.0
## cvpred            40.97 27.05 17.82 38.9 16.37 16.6 27.9  11.4 28.6 10.5
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.5 40.0   0.0 40.0 40.0
## CV residual       4.03 -4.55  4.68 28.6  6.13  5.9 12.1 -11.4 11.4 29.5
##                    185   214
## Predicted         10.8  9.01
## cvpred            10.3  9.02
## Survey_occupancy 40.0  0.00
## CV residual      29.7 -9.02
##
## Sum of squares = 6466    Mean square = 294    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51    63    74   102   109   122   129
## Predicted         14.9  23.7 36.82 15.65  8.40 41.29  14.4 29.90  10.8
## cvpred            16.2  24.5 37.76 16.23  9.59 41.81  15.2 30.78  11.3
## Survey_occupancy   0.0   0.0 45.00 22.50  0.00 45.00   0.0 22.50   0.0
## CV residual      -16.2 -24.5  7.24  6.27 -9.59  3.19 -15.2 -8.28 -11.3
##                     162   164   178   179   186  188   192   196   201
## Predicted         45.2  50.6  51.1 44.91 42.46 58.0 48.43  14.6  5.19
## cvpred            46.7  51.2  51.7 45.46 43.45 59.1 49.46  15.3  5.68
## Survey_occupancy   0.0  40.0  40.0 40.00 40.00 80.0 40.00   0.0  0.00
## CV residual      -46.7 -11.2 -11.7 -5.46 -3.45 20.9 -9.46 -15.3 -5.68
##                     209  212   215
## Predicted         5.40 14.1  41.1
## cvpred            5.89 14.7  41.9
## Survey_occupancy  0.00 40.0   0.0
## CV residual      -5.89 25.3 -41.9
##
## Sum of squares = 7192    Mean square = 342    n = 21
##
## fold 9
## Observations in test set: 21
##                      26    32    41    43    52    71   84   97   115   116
## Predicted         30.29 20.95 28.80 19.23  17.6  40.4 29.4 21.4 68.48  23.7
## cvpred            29.19 19.13 31.76 21.45  19.6  42.4 29.6 19.6 74.49  26.2
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.5 67.5 67.50   0.0
## CV residual      -6.69  3.37 -9.26  1.05 -19.6 -19.9 -7.1 47.9 -6.99 -26.2
##                     119   124  152   160  163   177   187   193   194   198
```

```
## Predicted         22.0 35.01 58.7  9.45 48.4  70.2  11.2 103.5 35.37 79.34
## cvpred            24.5 38.45 61.2  8.08 48.7  72.2  12.8 112.2 38.83 86.19
## Survey_occupancy   0.0 45.00 80.0  0.00 80.0  40.0   0.0  40.0 40.00 80.00
## CV residual      -24.5  6.55 18.8 -8.08 31.3 -32.2 -12.8 -72.2  1.17 -6.19
##                    216
## Predicted         5.13
## cvpred            4.39
## Survey_occupancy  0.00
## CV residual      -4.39
##
## Sum of squares = 12519    Mean square = 596    n = 21
##
## fold 10
## Observations in test set: 21
##                     10   14    23    31    36    39    44   46    50    59
## Predicted        27.6 18.4  15.1 18.48  19.4 15.61  11.6 38.7 15.14 15.71
## cvpred           26.9 18.0  16.6 19.83  20.7 14.37  10.5 36.8 13.92 15.34
## Survey_occupancy 45.0 22.5   0.0 22.50   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual      18.1  4.5 -16.6  2.67 -20.7  8.13 -10.5 30.7  8.58  7.16
##                     65    78    88  113   133   150   155  161   180  181
## Predicted        17.00  8.85  12.3 25.7  8.13 50.67  11.9 28.0  13.2 41.0
## cvpred           16.59  8.73  12.1 24.2  7.97 49.36  11.7 27.4  14.7 39.1
## Survey_occupancy 22.50  0.00   0.0 22.5 22.50 40.00   0.0 80.0   0.0 80.0
## CV residual       5.91 -8.73 -12.1 -1.7 14.53 -9.36 -11.7 52.6 -14.7 40.9
##                    183
## Predicted         68.4
## cvpred            65.7
## Survey_occupancy  80.0
## CV residual       14.3
##
## Sum of squares = 7869    Mean square = 375    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 354


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  80101   80101   236.2 <2e-16 ***
## Course_Level         5   1011     202     0.6    0.7
## Residuals          209  70870     339
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6     24    25   28    34    35    56   67
## Predicted           9.57  7.93 23.108 15.49 14.6 30.54 18.28  11.8 20.8
## cvpred             10.04  7.77 23.489 15.92 14.3 30.15 18.69  12.2 20.6
## Survey_occupancy    0.00  0.00 22.500 22.50 45.0 22.50 22.50   0.0 45.0
## CV residual       -10.04 -7.77 -0.989  6.58 30.7 -7.65  3.81 -12.2 24.4
##                       72    80    89    90     94   105    108   112   138  149
## Predicted          12.1  12.3  9.95 30.8 22.178 25.2 22.352  18.5  11.1 25.7
## cvpred             11.9  12.8  9.77 30.3 21.843 24.9 22.016  18.3  10.9 26.1
## Survey_occupancy 22.5   0.0  0.00 45.0 22.500 45.0 22.500   0.0   0.0 40.0
## CV residual        10.6 -12.8 -9.77 14.7  0.657 20.1  0.484 -18.3 -10.9 13.9
##                       165   211
## Predicted           52.0  7.33
## cvpred              52.2  7.18
## Survey_occupancy    40.0  0.00
## CV residual        -12.2 -7.18
##
## Sum of squares = 3810    Mean square = 181    n = 21
##
## fold 2
## Observations in test set: 22
##                        12    21    22     30    42    49    76   81     96
## Predicted          31.3 27.35 20.09 22.353 14.33 28.40 28.96 26.4 45.208
## cvpred             31.8 27.84 20.52 22.801 15.03 28.89 30.32 27.7 45.152
## Survey_occupancy 45.0 22.50 22.50 22.500 22.50 22.50 22.50 45.0 45.000
## CV residual        13.2 -5.34  1.98 -0.301  7.47 -6.39 -7.82 17.3 -0.152
##                       117  121   123  125   135   136   140   148   171   189
## Predicted           18.4 44.1 23.46 18.2  33.7  13.0 16.60  14.0  30.8  28.4
```

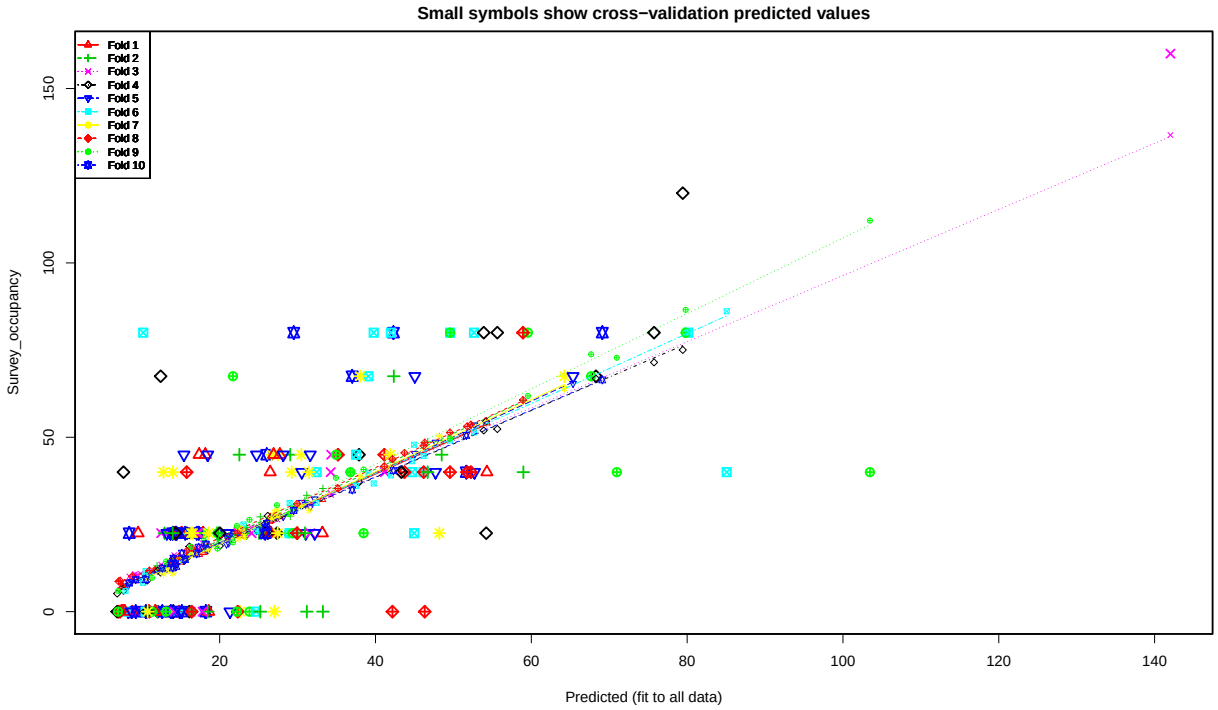
```
## cvpred            19.2 44.7 24.22 18.6  34.3  13.7 17.01  14.7  31.3  29.8
## Survey_occupancy   0.0 67.5 22.50 22.5  22.5   0.0 22.50   0.0   0.0   0.0
## CV residual      -19.2 22.8 -1.72  3.9 -11.8 -13.7  5.49 -14.7 -31.3 -29.8
##                    190   199   205
## Predicted         56.2  51.3  32.5
## cvpred            56.8  52.8  33.0
## Survey_occupancy  40.0  40.0   0.0
## CV residual      -16.8 -12.8 -33.0
##
## Sum of squares = 5539    Mean square = 252    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     8    13   19    20    40    48    54
## Predicted          9.65 17.27  10.4  10.0 27.9 13.72 15.46 30.13 20.20
## cvpred            11.31 17.36  12.0  11.6 27.5 13.99 15.64 29.58 20.15
## Survey_occupancy   0.00 22.50   0.0   0.0 45.0 22.50 22.50 22.50 22.50
## CV residual      -11.31  5.14 -12.0 -11.6 17.5  8.51  6.86 -7.08  2.35
##                     55    73    79    83    87   95   100   131   147
## Predicted         36.0  8.14  5.77 14.57  15.3 33.4 19.82 26.83 142.4
## cvpred            35.1  9.87  6.55 14.91  16.7 32.7 20.97 26.44 136.2
## Survey_occupancy  22.5  0.00  0.00 22.50   0.0 45.0 22.50 22.50 160.0
## CV residual      -12.6 -9.87 -6.55  7.59 -16.7 12.3  1.53 -3.94  23.8
##                    167   174   182   191
## Predicted        30.24 41.97  16.2  12.6
## cvpred           30.86 42.07  17.5  14.1
## Survey_occupancy 40.00 40.00   0.0   0.0
## CV residual       9.14 -2.07 -17.5 -14.1
##
## Sum of squares = 2883    Mean square = 131    n = 22
##
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45    57    69   82
## Predicted          11.1 14.74 27.99  12.6  16.5  17.0 42.28 28.45 11.5
## cvpred             10.4 13.34 28.38  11.8  18.0  18.5 41.27 25.71 10.8
## Survey_occupancy    0.0 22.50 22.50   0.0   0.0   0.0 45.00 22.50 67.5
## CV residual      -10.4  9.16 -5.88 -11.8 -18.0 -18.5  3.73 -3.21 56.7
##                     103   107    110   127  134   145   154  195  203   204
## Predicted         21.95  51.0 70.284 21.17 13.8  79.2 72.97 51.0 54.0 47.90
## cvpred            19.84  53.1 66.529 19.51 12.5  74.5 72.97 46.1 48.7 48.35
## Survey_occupancy 22.50  22.5 67.500 22.50 22.5 120.0 80.00 80.0 80.0 40.00
## CV residual       2.66 -30.6  0.971  2.99 10.0  45.5  7.03 33.9 31.3 -8.35
##                     206   208   210
## Predicted          7.16 10.24  11.1
## cvpred             6.87  9.64  15.1
## Survey_occupancy 40.00  0.00   0.0
## CV residual      33.13 -9.64 -15.1
##
## Sum of squares = 11067    Mean square = 503    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53    60    70    75    86   91    92
```

```
## Predicted        15.81 28.39 23.92 27.8 35.95 25.37  18.8  36.2 41.7  17.0
## cvpred           16.04 28.93 24.07 27.9 35.97 25.51  19.0  38.0 39.9  17.7
## Survey_occupancy 22.50 22.50 22.50 45.0 45.00 22.50   0.0  22.5 67.5   0.0
## CV residual       6.46 -6.43 -1.57 17.1  9.03 -3.01 -19.0 -15.5 27.6 -17.7
##                    98   106   114  118  139   141  142  158   168   176
## Predicted        11.8 64.71  4.59 28.2 16.5  9.31 19.6 28.2  48.5  53.6
## cvpred           10.4 64.44 -1.29 26.6 15.0  7.90 18.1 26.7  50.3  55.3
## Survey_occupancy 22.5 67.50 22.50 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual      12.1  3.06 23.79 18.4 30.0 -7.90 26.9 13.3 -10.3 -15.3
##                    202   213
## Predicted         16.0  8.20
## cvpred            16.2  6.81
## Survey_occupancy   0.0  0.00
## CV residual      -16.2 -6.81
##
## Sum of squares = 5717    Mean square = 260    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9   61    62    64   85   126   128   137   143
## Predicted        18.15  12.6 27.3  49.4 30.08 43.1 39.20  14.2  11.5  13.3
## cvpred           16.86  11.1 26.4  49.5 31.38 39.1 38.82  14.8  11.6  13.9
## Survey_occupancy 22.50   0.0 22.5  22.5 22.50 67.5 45.00   0.0   0.0   0.0
## CV residual       5.64 -11.1 -3.9 -27.0 -8.88 28.4  6.18 -14.8 -11.6 -13.9
##                    151  156  157   159   169  170   172  173  184  197
## Predicted         23.9 29.2 46.5  82.4 47.00 42.3 78.13 53.5 45.4 40.0
## cvpred            22.8 27.9 45.9  83.3 43.13 42.1 79.44 49.9 41.4 39.6
## Survey_occupancy   0.0 40.0 80.0  40.0 40.00 40.0 80.00 80.0 80.0 80.0
## CV residual      -22.8 12.1 34.1 -43.3 -3.13 -2.1  0.56 30.1 38.6 40.4
##                    200   207
## Predicted         8.96 11.26
## cvpred            7.27  9.67
## Survey_occupancy  0.00 80.00
## CV residual      -7.27 70.33
##
## Sum of squares = 15112    Mean square = 687    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99   101
## Predicted         24.9 27.8  16.3 30.2  31.3  49.5 30.6 19.87 18.89 63.60
## cvpred            24.8 27.9  15.3 29.3  31.3  49.6 29.9 18.91 18.89 63.72
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -24.8 17.1 -15.3 15.7 -31.3 -27.1 15.1  3.59  3.61  3.78
##                    104   111   120  130   132   144  146   153  166   175
## Predicted        41.00 18.95 16.86 40.9 17.44 17.67 28.5 10.93 29.0  9.77
## cvpred           41.03 17.81 16.86 40.9 16.48 16.71 28.5  9.94 28.9  8.77
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0  0.00 40.0 40.00
## CV residual       3.97  4.69  5.64 26.6  6.02  5.79 11.5 -9.94 11.1 31.23
##                    185  214
## Predicted        11.2 10.3
## cvpred           10.2  9.3
## Survey_occupancy 40.0  0.0
## CV residual      29.8 -9.3
```

```
##
## Sum of squares = 6525    Mean square = 297    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51    63    74   102   109  122   129
## Predicted         12.6  22.2 38.37 16.86  6.15 37.77  6.17 31.5  10.4
## cvpred            14.1  23.6 38.52 16.81  7.63 39.01  8.25 31.7  11.8
## Survey_occupancy   0.0   0.0 45.00 22.50  0.00 45.00  0.00 22.5   0.0
## CV residual      -14.1 -23.6  6.48  5.69 -7.63  5.99 -8.25 -9.2 -11.8
##                     162   164   178   179   186  188   192   196   201
## Predicted         43.2  52.6  53.1  47.0  47.1 56.8 49.84  14.8  6.52
## cvpred            44.5  57.4  57.9  51.8  51.9 58.0 49.96  14.8  6.50
## Survey_occupancy   0.0  40.0  40.0  40.0  40.0 80.0 40.00   0.0  0.00
## CV residual      -44.5 -17.4 -17.9 -11.8 -11.9 22.0 -9.96 -14.8 -6.50
##                     209  212   215
## Predicted         6.72 15.3  46.7
## cvpred            6.71 15.3  51.5
## Survey_occupancy  0.00 40.0   0.0
## CV residual      -6.71 24.7 -51.5
##
## Sum of squares = 8251    Mean square = 393    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97   115
## Predicted         26.19 20.15 27.25 17.80  19.3  42.9 28.59 17.4 69.66
## cvpred            25.47 19.82 26.63 16.39  18.9  44.4 30.33 16.0 73.43
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.50
## CV residual      -2.97  2.68 -4.13  6.11 -18.9 -21.9 -7.83 51.5 -5.93
##                     116   119  124  152   160  163   177   187   193  194
## Predicted         15.3  20.6 33.4 59.1  8.84 50.4  68.9  11.5 101.8 36.9
## cvpred            20.8  19.4 33.3 62.0  8.95 49.8  72.6  11.8 111.1 38.0
## Survey_occupancy   0.0   0.0 45.0 80.0  0.00 80.0  40.0   0.0  40.0 40.0
## CV residual      -20.8 -19.4 11.7 18.0 -8.95 30.2 -32.6 -11.8 -71.1  2.0
##                     198   216
## Predicted         77.9  6.46
## cvpred            85.2  6.37
## Survey_occupancy 80.0  0.00
## CV residual      -5.2 -6.37
##
## Sum of squares = 12243    Mean square = 583    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23    31    36    39    44   46    50    59
## Predicted         28.3 16.02  12.9 17.71  18.6 14.22 10.27 40.2 16.95 16.92
## cvpred            27.7 15.54  13.6 16.85  17.8 13.69  9.63 40.0 16.07 17.75
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.50  0.00 67.5 22.50 22.50
## CV residual      17.3  6.96 -13.6  5.65 -17.8  8.81 -9.63 27.5  6.43  4.75
##                      65    78    88   113   133   150   155  161   180  181
## Predicted         19.74  8.24 10.04 25.86  7.77  51.1  11.3 26.3  10.9 45.7
## cvpred            18.94  8.83  9.39 26.96  7.05  51.2  12.0 19.8  11.6 44.2
## Survey_occupancy 22.50  0.00  0.00 22.50 22.50  40.0   0.0 80.0   0.0 80.0
```

```
## CV residual       3.56 -8.83 -9.39 -4.46 15.45 -11.2 -12.0 60.2 -11.6 35.8
##                    183
## Predicted         67.1
## cvpred            61.8
## Survey_occupancy  80.0
## CV residual       18.2
##
## Sum of squares = 7941    Mean square = 378    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 366

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  80101   80101  236.16 <2e-16 ***
## Room                 1    260     260    0.77   0.38
## Factor_Time          3    392     131    0.38   0.76
## Residuals          210  71229     339
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      4     6     24    25   28    34    35    56   67
## Predicted         7.50  7.40 22.654 15.11 17.4 33.18 17.87  7.66 18.2
## cvpred            7.26  7.16 21.672 14.18 16.4 32.13 16.92  6.98 17.4
```

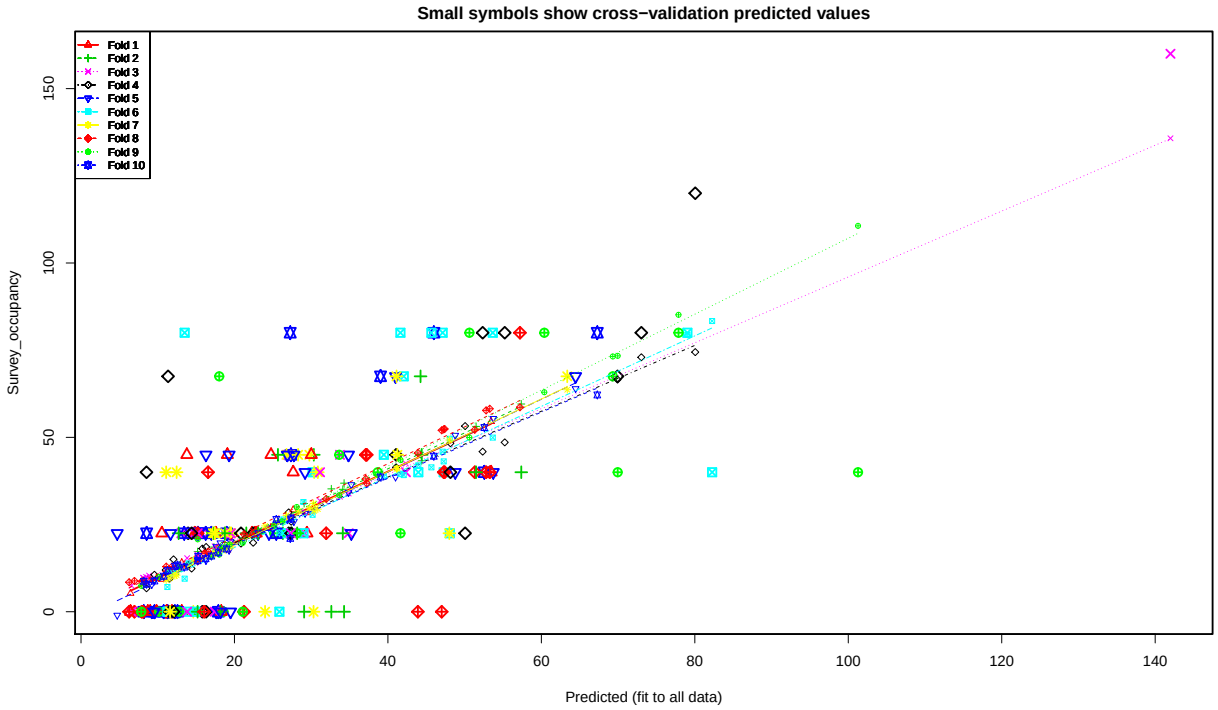
```
## Survey_occupancy  0.00  0.00 22.500 22.50 45.0 22.50 22.50  0.00 45.0
## CV residual      -7.26 -7.16  0.828  8.32 28.6 -9.63  5.58 -6.98 27.6
##                     72    80    89   90    94  105   108   112   138  149
## Predicted         9.53  11.7  10.9 26.9 26.41 27.7 26.58  18.6  11.7 26.5
## cvpred            8.84  12.0  11.1 27.0 25.89 27.2 26.06  19.0  11.5 27.1
## Survey_occupancy 22.50   0.0   0.0 45.0 22.50 45.0 22.50   0.0   0.0 40.0
## CV residual      13.66 -12.0 -11.1 18.0 -3.39 17.8 -3.56 -19.0 -11.5 12.9
##                    165   211
## Predicted         54.3  7.83
## cvpred            54.1  8.14
## Survey_occupancy  40.0  0.00
## CV residual      -14.1 -8.14
##
## Sum of squares = 3967    Mean square = 189    n = 21
##
## fold 2
## Observations in test set: 22
##                     12   21    22     30    42    49    76   81   96   117
## Predicted        29.1 30.0 19.66 21.906 12.91 25.32 25.06 22.5 48.5  18.5
## cvpred           27.4 29.6 19.38 21.594 12.52 24.77 24.69 22.2 49.1  19.3
## Survey_occupancy 45.0 22.5 22.50 22.500 22.50 22.50 22.50 45.0 45.0   0.0
## CV residual      17.6 -7.1  3.12  0.906  9.98 -2.27 -2.19 22.8 -4.1 -19.3
##                    121   123   125   135   136   140   148   171   189
## Predicted        42.4 23.45 19.86 30.94  12.0 13.97  16.4  33.3  25.2
## cvpred           42.8 24.19 20.64 31.87  13.1 15.12  17.4  35.3  27.2
## Survey_occupancy 67.5 22.50 22.50 22.50   0.0 22.50   0.0   0.0   0.0
## CV residual      24.7 -1.69  1.86 -9.37 -13.1  7.38 -17.4 -35.3 -27.2
##                    190   199   205
## Predicted         59.0 46.70  31.2
## cvpred            60.5 48.68  33.4
## Survey_occupancy  40.0 40.00   0.0
## CV residual      -20.5 -8.68 -33.4
##
## Sum of squares = 6215    Mean square = 283    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2      8     13   19    20    40    48    54
## Predicted          9.11 15.12   9.85   9.46 27.4 13.35 12.50 27.03 17.20
## cvpred            10.19 15.86  10.89  10.52 26.4 13.13 13.48 27.18 17.91
## Survey_occupancy   0.00 22.50   0.00   0.00 45.0 22.50 22.50 22.50 22.50
## CV residual      -10.19  6.64 -10.89 -10.52 18.6  9.37  9.02 -4.68  4.59
##                     55     73     79    83    87   95    100   131   147
## Predicted        31.64   9.13   8.41 17.12  16.3 34.3 22.435 24.10 142.0
## cvpred           30.61  10.78  10.10 18.31  17.5 33.5 22.263 24.07 136.7
## Survey_occupancy 22.50   0.00   0.00 22.50   0.0 45.0 22.500 22.50 160.0
## CV residual      -8.11 -10.78 -10.10  4.19 -17.5 11.5  0.237 -1.57  23.3
##                    167    174   182   191
## Predicted        34.26 41.202  17.8  14.2
## cvpred           33.98 40.531  19.6  16.2
## Survey_occupancy 40.00 40.000   0.0   0.0
## CV residual       6.02 -0.531 -19.6 -16.2
##
## Sum of squares = 2908    Mean square = 132    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45    57   69   82   103
## Predicted          10.6 15.79 25.74  12.0  16.1  14.0 37.90 27.4 12.4 26.17
## cvpred             10.3 15.36 24.99  11.7  18.7  15.3 37.08 26.9 11.2 27.47
## Survey_occupancy    0.0 22.50 22.50   0.0   0.0   0.0 45.00 22.5 67.5 22.50
## CV residual       -10.3  7.14 -2.49 -11.7 -18.7 -15.3  7.92 -4.4 56.3 -4.97
##                     107    110   127   134   145   154  195  203   204
## Predicted          54.2 68.297 20.03 14.32  79.4 75.75 53.9 55.6 43.33
## cvpred             54.6 66.816 18.87 13.35  75.0 71.47 52.0 52.4 40.46
## Survey_occupancy   22.5 67.500 22.50 22.50 120.0 80.00 80.0 80.0 40.00
## CV residual       -32.1  0.684  3.63  9.15  45.0  8.53 28.0 27.6 -0.46
##                     206   208   210
## Predicted          7.66 10.70  6.85
## cvpred             5.97  8.92  5.19
## Survey_occupancy 40.00  0.00  0.00
## CV residual       34.03 -8.92 -5.19
##
## Sum of squares = 10199    Mean square = 464    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53   60    70    75    86   91    92
## Predicted         13.68 31.05 20.88 24.7 31.6 21.15  18.2 32.20 45.1  21.3
## cvpred            13.35 30.82 19.36 23.2 30.0 19.68  18.4 32.33 45.3  21.8
## Survey_occupancy 22.50 22.50 22.50 45.0 45.0 22.50   0.0 22.50 67.5   0.0
## CV residual       9.15 -8.32  3.14 21.8 15.0  2.82 -18.4 -9.83 22.2 -21.8
##                     98   106  114  118  139   141  142   158   168   176
## Predicted         14.50 65.35 13.2 28.2 15.4  8.28 18.5 30.54 47.70  52.7
## cvpred            15.08 65.42 12.4 27.2 14.6  7.58 17.7 31.34 48.59  53.5
## Survey_occupancy 22.50 67.50 22.5 45.0 45.0  0.00 45.0 40.00 40.00  40.0
## CV residual       7.42  2.08 10.1 17.8 30.4 -7.58 27.3  8.66 -8.59 -13.5
##                    202   213
## Predicted         14.9  8.69
## cvpred            14.8  8.63
## Survey_occupancy   0.0  0.00
## CV residual      -14.8 -8.63
##
## Sum of squares = 5106    Mean square = 232    n = 22
##
## fold 6
## Observations in test set: 22
##                       5     9   61    62    64   85   126   128   137   143
## Predicted         16.00  10.5 23.1  45.0 28.98 39.1 37.52  14.8  10.5  13.9
## cvpred            17.36  11.6 25.0  47.9 31.18 39.8 36.08  14.7  10.2  13.8
## Survey_occupancy 22.50   0.0 22.5  22.5 22.50 67.5 45.00   0.0   0.0   0.0
## CV residual       5.14 -11.6 -2.5 -25.4 -8.68 27.7  8.92 -14.7 -10.2 -13.8
##                     151   156  157   159   169   170    172  173  184  197
## Predicted          24.7 32.45 49.6  85.1 46.18 44.71 80.151 52.6 42.0 39.8
## cvpred             23.1 31.21 49.1  86.1 44.67 43.13 80.118 51.4 39.1 36.8
## Survey_occupancy    0.0 40.00 80.0  40.0 40.00 40.00 80.000 80.0 80.0 80.0
## CV residual      -23.1  8.79 30.9 -46.1 -4.67 -3.13 -0.118 28.6 40.9 43.2
##                    200   207
```

```
## Predicted         7.92 10.19
## cvpred            5.88  8.25
## Survey_occupancy  0.00 80.00
## CV residual      -5.88 71.75
##
## Sum of squares = 15513    Mean square = 705    n = 22
##
## fold 7
## Observations in test set: 22
##                      15   29    37   58    66    68   77    93     99   101
## Predicted         22.6 30.5  14.8 27.5  27.0  48.2 26.7 22.48 23.147 64.26
## cvpred            23.8 30.3  15.2 29.0  28.5  50.3 26.8 20.93 21.613 63.99
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.500 67.50
## CV residual      -23.8 14.7 -15.2 16.0 -28.5 -27.8 18.2  1.57  0.887  3.51
##                     104   111   120  130   132   144  146   153  166 175
## Predicted        41.88 27.45 18.56 38.0 16.33 16.56 29.2  13.4 31.5  14
## cvpred           40.93 27.08 17.91 38.7 16.37 16.61 28.3  12.0 29.1  11
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0  40
## CV residual       4.07 -4.58  4.59 28.8  6.13  5.89 11.7 -12.0 10.9  29
##                   185  214
## Predicted        12.8 10.8
## cvpred           10.8  9.5
## Survey_occupancy 40.0  0.0
## CV residual      29.2 -9.5
##
## Sum of squares = 6341    Mean square = 288    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51   63     74   102   109  122   129
## Predicted         13.7  22.3 35.19 14.2   8.79 41.13  14.8 29.9  11.0
## cvpred            14.2  22.5 35.31 14.2  10.18 41.69  15.8 30.9  11.8
## Survey_occupancy   0.0   0.0 45.00 22.5   0.00 45.00   0.0 22.5   0.0
## CV residual      -14.2 -22.5  9.69  8.3 -10.18  3.31 -15.8 -8.4 -11.8
##                     162   164   178   179   186  188   192   196   201
## Predicted         46.3  51.8  52.2 46.18 43.73 58.9  49.6  16.4  7.02
## cvpred            48.5  53.1  53.6 47.57 45.52 60.7  51.3  18.3  8.68
## Survey_occupancy   0.0  40.0  40.0 40.00 40.00 80.0  40.0   0.0  0.00
## CV residual      -48.5 -13.1 -13.6 -7.57 -5.52 19.3 -11.3 -18.3 -8.68
##                     209  212   215
## Predicted         7.23 15.8  42.2
## cvpred            8.88 17.4  43.8
## Survey_occupancy  0.00 40.0   0.0
## CV residual      -8.88 22.6 -43.8
##
## Sum of squares = 7652    Mean square = 364    n = 21
##
## fold 9
## Observations in test set: 21
##                      26   32    41   43    52    71    84   97  115   116
## Predicted        28.9 19.7 27.34 18.0  16.3  38.5 29.37 21.7 67.7  23.8
## cvpred           28.0 18.1 30.53 20.4  18.6  40.8 29.59 19.9 73.8  26.3
## Survey_occupancy 22.5 22.5 22.50 22.5   0.0  22.5 22.50 67.5 67.5   0.0
## CV residual      -5.5  4.4 -8.03  2.1 -18.6 -18.3 -7.09 47.6 -6.3 -26.3
```

```
##                     119   124  152   160  163   177   187   193     194
## Predicted          22.2 34.93 59.6 11.32 49.6  71.0  13.1 103.5 36.7809
## cvpred             24.6 38.36 61.9  9.69 49.7  72.8  14.4 112.1 39.9897
## Survey_occupancy    0.0 45.00 80.0  0.00 80.0  40.0   0.0  40.0 40.0000
## CV residual       -24.6  6.64 18.1 -9.69 30.3 -32.8 -14.4 -72.1  0.0103
##                     198   216
## Predicted         79.81  6.97
## cvpred            86.56  5.93
## Survey_occupancy 80.00  0.00
## CV residual       -6.56 -5.93
##
## Sum of squares = 12410    Mean square = 591    n = 21
##
## fold 10
## Observations in test set: 21
##                      10    14    23    31    36    39    44   46    50    59
## Predicted         26.0 17.05  14.0 17.30  18.2 14.44 10.52 37.0 13.98 14.31
## cvpred            25.3 16.56  15.3 18.48  19.4 12.98  9.18 34.9 12.54 13.73
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.50  0.00 67.5 22.50 22.50
## CV residual       19.7  5.94 -15.3  4.02 -19.4  9.52 -9.18 32.6  9.96  8.77
##                      65    78    88   113   133   150   155  161   180  181
## Predicted         15.57  9.22  12.6 25.84  8.39  51.7  13.7 29.5  15.1 42.3
## cvpred            14.96  9.16  12.5 24.25  8.18  50.5  13.7 29.0  16.8 40.4
## Survey_occupancy 22.50  0.00   0.0 22.50 22.50  40.0   0.0 80.0   0.0 80.0
## CV residual       7.54 -9.16 -12.5 -1.75 14.32 -10.5 -13.7 51.0 -16.8 39.6
##                     183
## Predicted          69.1
## cvpred             66.4
## Survey_occupancy 80.0
## CV residual        13.6
##
## Sum of squares = 7896    Mean square = 376    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 362


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  80101   80101  235.78 <2e-16 ***
## Room                 1    260     260    0.77   0.38
## Course_Level         5    957     191    0.56   0.73
## Residuals          208  70664     340
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6     24    25   28   34    35    56   67    72
## Predicted           9.02  6.45 22.282 14.82 13.8 29.4 17.55  11.2 19.1 10.54
## cvpred              9.14  5.27 22.168 14.84 13.0 28.4 17.52  11.2 17.7  9.28
## Survey_occupancy    0.00  0.00 22.500 22.50 45.0 22.5 22.50   0.0 45.0 22.50
## CV residual        -9.14 -5.27  0.332  7.66 32.0 -5.9  4.98 -11.2 27.3 13.22
##                       80    89    90     94   105    108   112   138  149
## Predicted           13.1  9.85 30.0 22.669 24.8 22.839  18.3  11.9 27.7
## cvpred              14.1  9.48 28.9 22.621 24.1 22.789  17.8  12.0 29.2
## Survey_occupancy     0.0  0.00 45.0 22.500 45.0 22.500   0.0   0.0 40.0
## CV residual        -14.1 -9.48 16.1 -0.121 20.9 -0.289 -17.8 -12.0 10.8
##                       165   211
## Predicted           53.4  8.71
## cvpred              54.5  9.24
## Survey_occupancy    40.0  0.00
## CV residual        -14.5 -9.24
##
## Sum of squares = 4157    Mean square = 198    n = 21
##
## fold 2
## Observations in test set: 22
##                        12    21    22   30   42    49    76   81    96   117
## Predicted           30.3 26.32 19.32 21.5 12.7 27.47 28.17 25.7 44.41  18.2
## cvpred              29.8 25.72 18.91 21.1 11.6 26.95 28.54 26.1 43.29  18.6
## Survey_occupancy    45.0 22.50 22.50 22.5 22.5 22.50 22.50 45.0 45.00   0.0
## CV residual         15.2 -3.22  3.59  1.4 10.9 -4.45 -6.04 18.9  1.71 -18.6
##                       121    123   125   135   136   140   148   171   189
## Predicted           44.3 23.088 18.74  34.1  12.9 17.33  15.2  32.6  29.1
```

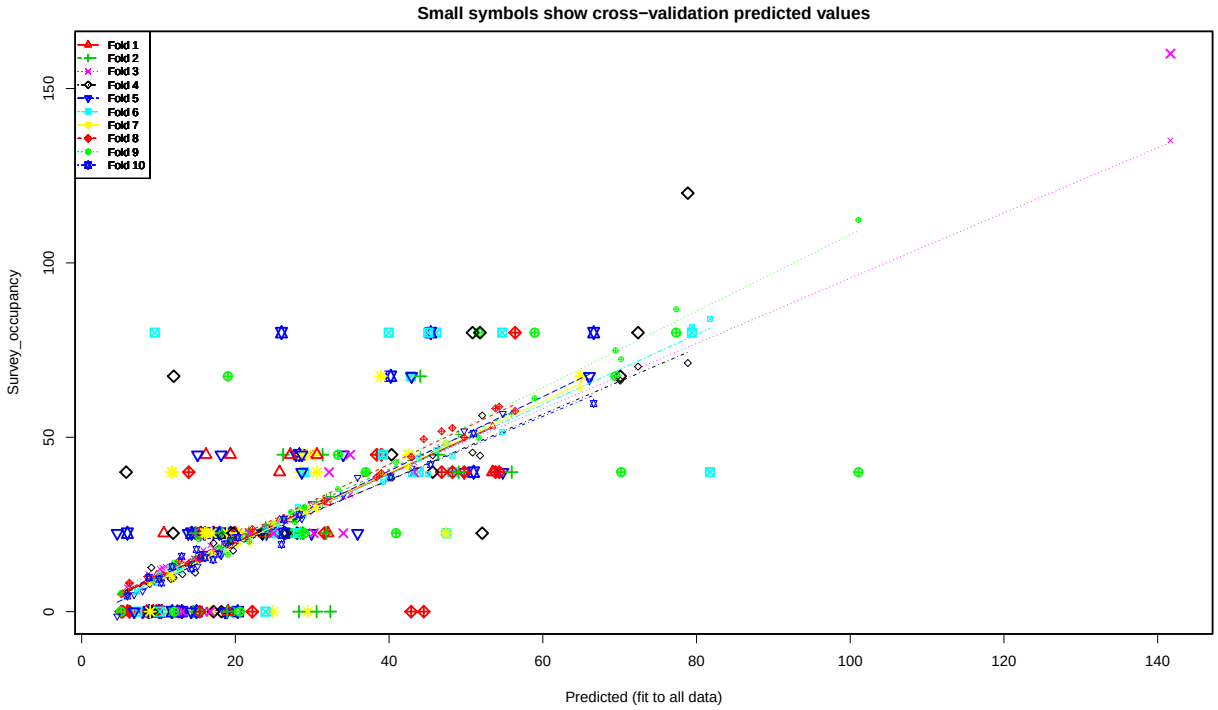
```
## cvpred           45.1 23.422 19.85  35.1  13.3 18.54  17.2  35.2  31.0
## Survey_occupancy 67.5 22.500 22.50  22.5   0.0 22.50   0.0   0.0   0.0
## CV residual      22.4 -0.922  2.65 -12.6 -13.3  3.96 -17.2 -35.2 -31.0
##                    190   199   205
## Predicted         57.4  51.5  34.3
## cvpred            59.6  53.1  36.9
## Survey_occupancy  40.0  40.0   0.0
## CV residual      -19.6 -13.1 -36.9
##
## Sum of squares = 6416    Mean square = 292    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2      8    13   19    20    40    48    54
## Predicted         8.15 16.56   8.88  8.49 27.0 13.08 14.78 29.16 19.44
## cvpred            9.67 16.52  10.36  9.99 26.4 13.22 14.84 28.47 19.25
## Survey_occupancy  0.00 22.50   0.00  0.00 45.0 22.50 22.50 22.50 22.50
## CV residual      -9.67  5.98 -10.36 -9.99 18.6  9.28  7.66 -5.97  3.25
##                     55    73    79    83    87   95   100   131   147  167
## Predicted         34.9  8.08  6.59 15.21  15.1 33.8 19.53 27.34 142.0 31.2
## cvpred            33.9  9.77  7.45 15.63  16.5 33.0 20.62 26.91 135.8 31.8
## Survey_occupancy  22.5  0.00  0.00 22.50   0.0 45.0 22.50 22.50 160.0 40.0
## CV residual      -11.4 -9.77 -7.45  6.87 -16.5 12.0  1.88 -4.41  24.2  8.2
##                    174   182   191
## Predicted        42.34  17.4  13.8
## cvpred           42.48  18.8  15.4
## Survey_occupancy 40.00   0.0   0.0
## CV residual      -2.48 -18.8 -15.4
##
## Sum of squares = 2890    Mean square = 131    n = 22
##
## fold 4
## Observations in test set: 22
##                       3    11    17  18    27    45    57    69   82   103
## Predicted          9.57 13.96 27.06  11  15.8  16.3 41.07 27.40 11.4 22.44
## cvpred            10.60 13.42 28.49  12  18.1  18.6 41.41 25.82 10.8 19.78
## Survey_occupancy   0.00 22.50 22.50   0   0.0   0.0 45.00 22.50 67.5 22.50
## CV residual      -10.60  9.08 -5.99 -12 -18.1 -18.6  3.59 -3.32 56.7  2.72
##                     107    110   127  134   145   154  195  203   204   206
## Predicted          50.1 69.926 20.85 14.4  80.1 73.03 52.3 55.2 48.15  8.54
## cvpred             53.2 66.565 19.54 12.4  74.4 72.96 45.9 48.6 48.31  6.72
## Survey_occupancy   22.5 67.500 22.50 22.5 120.0 80.00 80.0 80.0 40.00 40.00
## CV residual      -30.7  0.935  2.96 10.1  45.6  7.04 34.1 31.4 -8.31 33.28
##                    208   210
## Predicted        11.55  12.1
## cvpred            9.51  15.0
## Survey_occupancy  0.00   0.0
## CV residual      -9.51 -15.0
##
## Sum of squares = 11119    Mean square = 505    n = 22
##
## fold 5
## Observations in test set: 22
##                      7    33     47   53   60    70    75    86   91    92
```

```
## Predicted        15.1 27.34 23.079 26.9 34.9 24.50  19.5  35.2 41.0  17.6
## cvpred           14.9 27.18 22.652 26.4 34.2 24.04  20.1  36.4 38.6  18.7
## Survey_occupancy 22.5 22.50 22.500 45.0 45.0 22.50   0.0  22.5 67.5   0.0
## CV residual       7.6 -4.68 -0.152 18.6 10.8 -1.54 -20.1 -13.9 28.9 -18.7
##                    98   106    114  118  139   141  142  158   168   176
## Predicted        11.7 64.46  4.720 27.7 16.3  9.22 19.3 29.2  48.8  53.7
## cvpred           10.2 63.97 -0.995 25.9 14.7  7.81 17.6 28.2  50.6  55.4
## Survey_occupancy 22.5 67.50 22.500 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual      12.3  3.53 23.495 19.1 30.3 -7.81 27.4 11.8 -10.6 -15.4
##                    202   213
## Predicted         18.2  9.56
## cvpred            19.7  9.08
## Survey_occupancy   0.0  0.00
## CV residual      -19.7 -9.08
##
## Sum of squares = 6097    Mean square = 277    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85  126   128   137   143
## Predicted        17.43  12.0 26.38  48.1 28.99 42.1 39.5  14.8  11.4  14.0
## cvpred           16.91  11.1 26.46  49.6 31.46 39.2 38.8  14.8  11.6  13.9
## Survey_occupancy 22.50   0.0 22.50  22.5 22.50 67.5 45.0   0.0   0.0   0.0
## CV residual       5.59 -11.1 -3.96 -27.1 -8.96 28.3  6.2 -14.8 -11.6 -13.9
##                    151  156  157   159   169   170    172  173  184  197
## Predicted         25.9 30.2 47.1  82.3 47.27 43.96 79.031 53.7 45.7 41.6
## cvpred            22.7 27.8 45.9  83.4 43.11 41.97 79.371 49.9 41.4 39.5
## Survey_occupancy   0.0 40.0 80.0  40.0 40.00 40.00 80.000 80.0 80.0 80.0
## CV residual      -22.7 12.2 34.1 -43.4 -3.11 -1.97  0.629 30.1 38.6 40.5
##                    200   207
## Predicted        11.26 13.51
## cvpred            7.09  9.48
## Survey_occupancy  0.00 80.00
## CV residual      -7.09 70.52
##
## Sum of squares = 15147    Mean square = 688    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99   101
## Predicted         24.0 26.8  14.6 28.3  30.3  48.0 29.8 19.57 19.44 63.37
## cvpred            24.6 27.6  14.9 28.8  31.0  49.2 29.7 18.84 19.02 63.65
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -24.6 17.4 -14.9 16.2 -31.0 -26.7 15.3  3.66  3.48  3.85
##                    104   111  120  130   132   144  146   153  166   175
## Predicted        41.23 18.80 17.5 41.1 17.19 17.42 30.4  12.2 30.9 11.10
## cvpred           41.09 17.76 17.0 41.0 16.42 16.65 28.9  10.3 29.4  9.11
## Survey_occupancy 45.00 22.50 22.5 67.5 22.50 22.50 40.0   0.0 40.0 40.00
## CV residual       3.91  4.74  5.5 26.5  6.08  5.85 11.1 -10.3 10.6 30.89
##                    185   214
## Predicted        12.5 11.61
## cvpred           10.5  9.63
## Survey_occupancy 40.0  0.00
## CV residual      29.5 -9.63
```

```
##
## Sum of squares = 6446    Mean square = 293    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51    63    74   102   109   122   129
## Predicted         11.9  21.2 37.24 15.20  6.96 37.12  6.27 31.96  11.1
## cvpred            12.9  22.2 36.84 14.44  8.84 38.09  8.46 32.35  12.9
## Survey_occupancy   0.0   0.0 45.00 22.50  0.00 45.00  0.00 22.50   0.0
## CV residual      -12.9 -22.2  8.16  8.06 -8.84  6.91 -8.46 -9.85 -12.9
##                     162   164   178   179   186  188   192   196   201
## Predicted         43.9  52.8  53.3  47.3  47.4 57.2  51.3  16.1  7.91
## cvpred            45.5  57.7  58.2  52.3  52.4 58.6  52.2  16.7  8.69
## Survey_occupancy   0.0  40.0  40.0  40.0  40.0 80.0  40.0   0.0  0.00
## CV residual      -45.5 -17.7 -18.2 -12.3 -12.4 21.4 -12.2 -16.7 -8.69
##                     209  212 215
## Predicted         8.11 16.6  47
## cvpred            8.89 17.2  52
## Survey_occupancy  0.00 40.0   0
## CV residual      -8.89 22.8 -52
##
## Sum of squares = 8541    Mean square = 407    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97  115   116
## Predicted        25.18 19.38 26.22 16.96  18.6  41.6 28.12 18.0 69.3  15.2
## cvpred           24.71 19.28 25.85 15.75  18.4  43.5 30.04 16.4 73.2  20.8
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.5   0.0
## CV residual      -2.21  3.22 -3.35  6.75 -18.4 -21.0 -7.54 51.1 -5.7 -20.8
##                     119  124  152   160  163   177   187   193    194   198
## Predicted         21.1 33.7 60.4 10.19 50.6  69.9  12.8 101.3 38.670 77.87
## cvpred            19.7 33.4 62.9  9.97 50.0  73.4  12.8 110.7 39.269 85.14
## Survey_occupancy   0.0 45.0 80.0  0.00 80.0  40.0   0.0  40.0 40.000 80.00
## CV residual      -19.7 11.6 17.1 -9.97 30.0 -33.4 -12.8 -70.7  0.731 -5.14
##                     216
## Predicted         7.85
## cvpred            7.42
## Survey_occupancy  0.00
## CV residual      -7.42
##
## Sum of squares = 12154    Mean square = 579    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23    31    36   39    44   46    50    59
## Predicted        27.4 15.21  11.3 16.99  17.9 13.4  9.58 39.0 16.25 15.26
## cvpred           26.6 14.61  11.8 15.97  16.9 12.8  8.82 38.6 15.21 15.87
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.5  0.00 67.5 22.50 22.50
## CV residual      18.4  7.89 -11.8  6.53 -16.9  9.7 -8.82 28.9  7.29  6.63
##                     65    78    88   113   133   150   155  161   180  181
## Predicted        18.98  8.18  10.8 25.45  8.55  52.6  12.6 27.3  12.2 46.0
## cvpred           18.02  8.73  10.2 26.48  7.90  52.8  13.4 21.0  13.0 44.6
## Survey_occupancy 22.50  0.00   0.0 22.50 22.50  40.0   0.0 80.0   0.0 80.0
```

```
## CV residual       4.48 -8.73 -10.2 -3.98 14.60 -12.8 -13.4 59.0 -13.0 35.4
##                    183
## Predicted         67.3
## cvpred            62.2
## Survey_occupancy  80.0
## CV residual       17.8
##
## Sum of squares = 7961    Mean square = 379    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 375

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  80101   80101  233.84 <2e-16 ***
## Factor_Time          3    359     120    0.35   0.79
## Course_Level         5    958     192    0.56   0.73
## Residuals          206  70564     343
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6    24    25   28    34    35    56   67   72
## Predicted           9.73  8.46 24.75 17.18 16.2 32.05 19.95  10.0 19.4 10.7
## cvpred             10.58  8.56 24.67 17.16 15.5 31.23 19.91  10.3 18.9 10.3
```

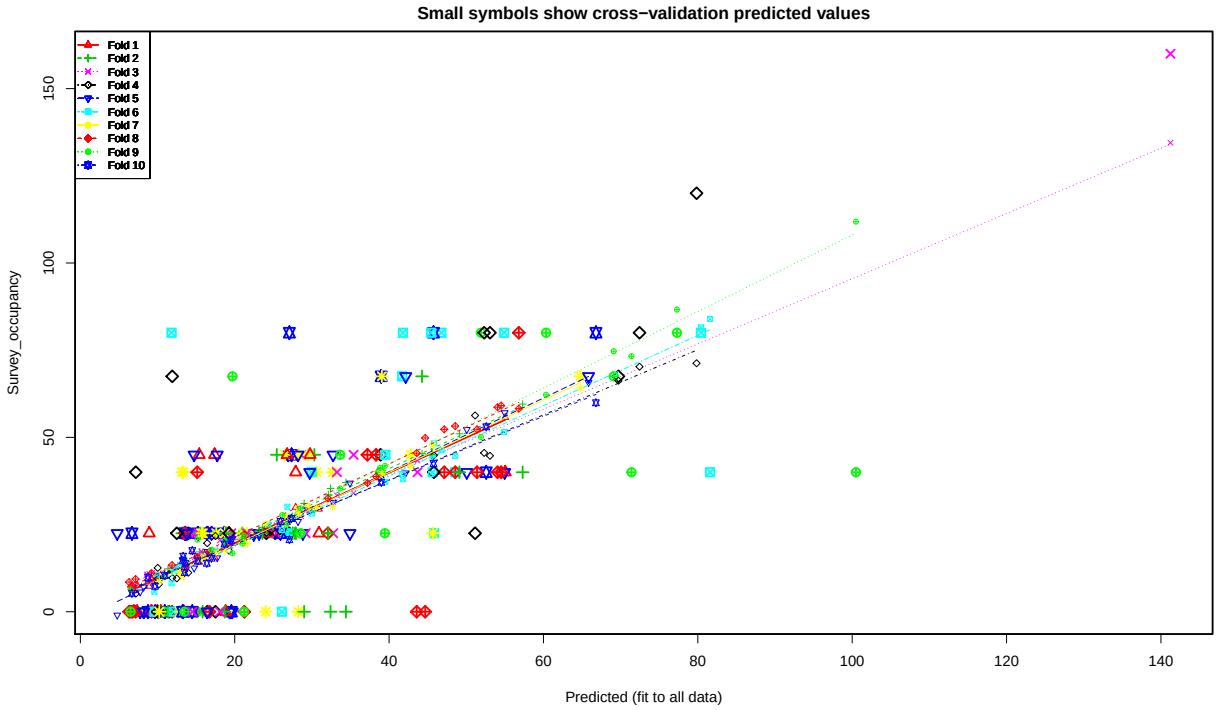
```
## Survey_occupancy   0.00  0.00 22.50 22.50 45.0 22.50 22.50   0.0 45.0 22.5
## CV residual      -10.58 -8.56 -2.17  5.34 29.5 -8.73  2.59 -10.3 26.1 12.2
##                     80    89   90     94  105    108   112   138  149
## Predicted         12.5  10.5 30.6 23.736 27.2 23.910  19.0  9.31 25.8
## cvpred            13.3  10.6 30.5 22.979 26.3 23.151  19.2  8.94 26.5
## Survey_occupancy   0.0   0.0 45.0 22.500 45.0 22.500   0.0  0.00 40.0
## CV residual      -13.3 -10.6 14.5 -0.479 18.7 -0.651 -19.2 -8.94 13.5
##                    165   211
## Predicted         53.5  5.97
## cvpred            53.2  5.56
## Survey_occupancy  40.0  0.00
## CV residual      -13.2 -5.56
##
## Sum of squares = 3799    Mean square = 181    n = 21
##
## fold 2
## Observations in test set: 22
##                      12    21     22    30    42    49    76   81   96   117
## Predicted         31.4 28.87 21.747 24.00 14.86 28.48 28.75 26.2 46.4  18.9
## cvpred            31.0 29.47 22.386 24.64 15.83 29.23 29.16 26.6 46.9  19.9
## Survey_occupancy 45.0 22.50 22.500 22.50 22.50 22.50 22.50 45.0 45.0   0.0
## CV residual       14.0 -6.97  0.114 -2.14  6.67 -6.73 -6.66 18.4 -1.9 -19.9
##                    121   123   125   135   136   140   148   171   189
## Predicted         44.1 23.93 18.23  31.8  11.6 14.82  14.4  32.4  28.3
## cvpred            44.9 24.93 18.88  32.8  12.8 15.73  14.3  33.0  29.8
## Survey_occupancy 67.5 22.50 22.50  22.5   0.0 22.50   0.0   0.0   0.0
## CV residual       22.6 -2.43  3.62 -10.3 -12.8  6.77 -14.3 -33.0 -29.8
##                     190   199   205
## Predicted          56.0  49.1  30.6
## cvpred             56.7  50.8  31.5
## Survey_occupancy   40.0  40.0   0.0
## CV residual       -16.7 -10.8 -31.5
##
## Sum of squares = 5543    Mean square = 252    n = 22
##
## fold 3
## Observations in test set: 22
##                        1    2     8    13   19    20    40    48    54    55
## Predicted          10.2 17.4  10.9  10.5 29.5 15.42 15.62 30.20 20.34  34.1
## cvpred             12.2 17.8  12.9  12.6 28.5 15.15 16.72 30.48 21.17  32.9
## Survey_occupancy    0.0 22.5   0.0   0.0 45.0 22.50 22.50 22.50 22.50  22.5
## CV residual       -12.2  4.7 -12.9 -12.6 16.5  7.35  5.78 -7.98  1.33 -10.4
##                       73    79    83    87   95     100   131   147   167
## Predicted           8.67  5.87 14.61  15.8 34.9 21.8433 24.98 141.7 32.19
## cvpred             10.82  7.00 15.25  17.6 33.6 22.4509 24.34 135.1 32.22
## Survey_occupancy    0.00  0.00 22.50   0.0 45.0 22.5000 22.50 160.0 40.00
## CV residual       -10.82 -7.00  7.25 -17.6 11.4  0.0491 -1.84  24.9  7.78
##                     174   182   191
## Predicted         43.25  16.7  13.1
## cvpred            42.83  19.0  15.6
## Survey_occupancy 40.00   0.0   0.0
## CV residual       -2.83 -19.0 -15.6
##
## Sum of squares = 2983    Mean square = 136    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3   11    17    18    27    45    57      69    82
## Predicted         11.62 14.8 28.03  13.1  18.2  17.2 40.33 26.5038 11.98
## cvpred             9.39 11.2 26.52  10.7  21.7  19.6 38.32 22.4484  9.71
## Survey_occupancy   0.00 22.5 22.50   0.0   0.0   0.0 45.00 22.5000 67.50
## CV residual       -9.39 11.3 -4.02 -10.7 -21.7 -19.6  6.68  0.0516 57.79
##                     103   107   110   127   134   145   154  195  203
## Predicted         23.506  52.1 70.09 19.72 11.90  78.9 72.40 50.9 51.8
## cvpred            22.669  56.2 66.23 17.49  9.59  71.3 70.26 45.6 44.8
## Survey_occupancy  22.500  22.5 67.50 22.50 22.50 120.0 80.00 80.0 80.0
## CV residual       -0.169 -33.7  1.27  5.01 12.91  48.7  9.74 34.4 35.2
##                     204   206   208    210
## Predicted         45.67  5.80  8.85   9.08
## cvpred            44.83  5.23  7.92  12.62
## Survey_occupancy  40.00 40.00  0.00   0.00
## CV residual       -4.83 34.77 -7.92 -12.62
##
## Sum of squares = 12266    Mean square = 558    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53   60     70    75    86   91    92
## Predicted         15.93 29.91 24.03 27.9 34.0 23.533  18.9  35.9 42.9  18.6
## cvpred            16.72 30.91 23.61 27.5 33.4 23.001  19.7  38.5 41.1  19.7
## Survey_occupancy  22.50 22.50 22.50 45.0 45.0 22.500   0.0  22.5 67.5   0.0
## CV residual        5.78 -8.41 -1.11 17.5 11.6 -0.501 -19.7 -16.0 26.4 -19.7
##                      98   106   114  118  139   141  142  158   168   176
## Predicted         13.88 66.07  4.63 28.6 15.1  7.93 18.1 28.6  49.8  54.8
## cvpred            12.69 66.16 -1.28 26.6 13.0  5.93 16.1 27.8  51.8  56.8
## Survey_occupancy  22.50 67.50 22.50 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual        9.81  1.34 23.78 18.4 32.0 -5.93 28.9 12.2 -11.8 -16.8
##                     202   213
## Predicted          14.2  6.83
## cvpred             13.8  4.84
## Survey_occupancy    0.0  0.00
## CV residual      -13.8 -4.84
##
## Sum of squares = 5950    Mean square = 270    n = 22
##
## fold 6
## Observations in test set: 22
##                       5     9    61    62    64   85   126   128   137
## Predicted         18.26  12.7 25.44  47.4 28.12 42.8 39.21  12.3  10.2
## cvpred            17.49  11.7 25.01  48.2 30.07 39.5 37.24  13.4  10.6
## Survey_occupancy  22.50   0.0 22.50  22.5 22.50 67.5 45.00   0.0   0.0
## CV residual        5.01 -11.7 -2.51 -25.7 -7.57 28.0  7.76 -13.4 -10.6
##                     143   151  156  157   159  169   170   172  173  184
## Predicted          11.5  23.9 29.0 46.1  81.8 48.2 43.85 79.40 54.7 45.1
## cvpred             12.5  23.5 28.2 46.3  83.9 44.7 44.03 81.58 51.5 39.5
## Survey_occupancy    0.0   0.0 40.0 80.0  40.0 40.0 40.00 80.00 80.0 80.0
## CV residual      -12.5 -23.5 11.8 33.7 -43.9 -4.7 -4.03 -1.58 28.5 40.5
##                  197   200   207
```

```
## Predicted         40  7.23  9.51
## cvpred            38  5.78  8.19
## Survey_occupancy  80  0.00 80.00
## CV residual       42 -5.78 71.81
##
## Sum of squares = 15379    Mean square = 699    n = 22
##
## fold 7
## Observations in test set: 22
##                      15   29    37   58    66    68   77    93    99   101
## Predicted         24.9 29.3  16.8 28.7  29.4  47.4 30.4 21.89 20.47 64.97
## cvpred            25.5 28.4  15.4 28.2  30.1  48.4 30.5 19.59 19.46 64.17
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -25.5 16.6 -15.4 16.8 -30.1 -25.9 14.5  2.91  3.04  3.33
##                     104   111   120  130   132   144  146   153  166   175
## Predicted        42.52 18.90 16.93 38.9 16.01 16.24 28.5  11.4 30.6 11.86
## cvpred           41.53 17.79 16.86 39.7 15.42 15.65 29.2  10.8 29.5  9.47
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.00
## CV residual       3.47  4.71  5.64 27.8  7.08  6.85 10.8 -10.8 10.5 30.53
##                    185   214
## Predicted        11.7  8.91
## cvpred           10.3  8.26
## Survey_occupancy 40.0  0.00
## CV residual      29.7 -8.26
##
## Sum of squares = 6425    Mean square = 292    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51    63    74   102   109   122    129
## Predicted         12.6  22.2 38.39 15.43  6.24 39.00  6.20 31.59   8.55
## cvpred            14.5  23.7 38.56 15.29  8.10 39.72  8.28 31.77  10.08
## Survey_occupancy   0.0   0.0 45.00 22.50  0.00 45.00  0.00 22.50   0.00
## CV residual      -14.5 -23.7  6.44  7.21 -8.10  5.28 -8.28 -9.27 -10.08
##                     162   164   178   179   186  188   192   196   201
## Predicted         42.9  53.8  54.3  48.2  46.8 56.4 49.78  15.4  5.16
## cvpred            44.4  58.3  58.8  52.7  51.7 57.6 49.95  15.1  5.02
## Survey_occupancy   0.0  40.0  40.0  40.0  40.0 80.0 40.00   0.0  0.00
## CV residual      -44.4 -18.3 -18.8 -12.7 -11.7 22.4 -9.95 -15.1 -5.02
##                     209  212   215
## Predicted         5.37 13.9  44.5
## cvpred            5.22 13.8  49.5
## Survey_occupancy  0.00 40.0   0.0
## CV residual      -5.22 26.2 -49.5
##
## Sum of squares = 8189    Mean square = 390    n = 21
##
## fold 9
## Observations in test set: 21
##                      26    32    41    43    52    71   84   97   115   116
## Predicted        27.72 21.80 27.25 17.86  19.5  40.9 29.0 19.0 69.46  15.3
## cvpred           25.69 20.12 28.56 18.42  21.0  42.9 29.9 16.3 74.94  20.8
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.5 67.5 67.50   0.0
## CV residual      -3.19  2.38 -6.06  4.08 -21.0 -20.4 -7.4 51.2 -7.44 -20.8
```

```
##                     119   124  152   160  163   177   187   193   194   198
## Predicted          20.6 33.35 58.9  9.37 51.6  70.2  12.1 101.1 36.96 77.35
## cvpred             21.4 35.14 61.1  8.72 49.9  72.4  14.1 112.3 39.85 86.72
## Survey_occupancy    0.0 45.00 80.0  0.00 80.0  40.0   0.0  40.0 40.00 80.00
## CV residual       -21.4  9.86 18.9 -8.72 30.1 -32.4 -14.1 -72.3  0.15 -6.72
##                     216
## Predicted          5.10
## cvpred             5.33
## Survey_occupancy   0.00
## CV residual       -5.33
##
## Sum of squares = 12530    Mean square = 597    n = 21
##
## fold 10
## Observations in test set: 21
##                      10    14    23    31    36   39    44   46    50    59
## Predicted         28.3 16.05  14.9 19.38  20.3 14.3 10.38 40.2 17.10 15.49
## cvpred            27.8 15.44  17.8 20.33  21.3 12.3  8.23 38.7 14.88 16.11
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.5  0.00 67.5 22.50 22.50
## CV residual       17.2  7.06 -17.8  2.17 -21.3 10.2 -8.23 28.8  7.62  6.39
##                      65    78    88   113   133   150   155  161   180  181
## Predicted         17.93  8.77 10.11 26.32  5.96  51.0  11.8 26.0  13.0 45.4
## cvpred            16.53  9.78  9.32 26.45  4.48  51.1  12.9 19.2  15.9 42.2
## Survey_occupancy 22.50  0.00  0.00 22.50 22.50  40.0   0.0 80.0   0.0 80.0
## CV residual       5.97 -9.78 -9.32 -3.95 18.02 -11.1 -12.9 60.8 -15.9 37.8
##                     183
## Predicted          66.6
## cvpred             59.7
## Survey_occupancy   80.0
## CV residual        20.3
##
## Sum of squares = 8862    Mean square = 422    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 379


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  80101   80101  233.49 <2e-16 ***
## Room                 1    260     260    0.76   0.38
## Factor_Time          3    392     131    0.38   0.77
## Course_Level         5    903     181    0.53   0.76
## Residuals          205  70326     343
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6     24    25   28    34    35    56   67
## Predicted           9.18  6.93 23.912 16.51 15.4 30.91 19.22  9.24 17.4
## cvpred              9.74  6.05 23.325 16.06 14.2 29.42 18.72  9.09 15.6
## Survey_occupancy    0.00  0.00 22.500 22.50 45.0 22.50 22.50  0.00 45.0
## CV residual        -9.74 -6.05 -0.825  6.44 30.8 -6.92  3.78 -9.09 29.4
##                       72    80    89    90    94   105   108   112   138  149
## Predicted           8.92  13.4  10.4 29.8 24.32 26.8 24.49  18.8  9.95 27.9
## cvpred              7.29  14.8  10.4 29.1 23.85 25.6 24.02  18.7  9.92 29.9
## Survey_occupancy   22.50   0.0   0.0 45.0 22.50 45.0 22.50   0.0  0.00 40.0
## CV residual        15.21 -14.8 -10.4 15.9 -1.35 19.4 -1.52 -18.7 -9.92 10.1
##                      165   211
## Predicted           55.0  7.35
## cvpred              55.7  7.56
## Survey_occupancy    40.0  0.00
## CV residual        -15.7 -7.56
##
## Sum of squares = 4179    Mean square = 199    n = 21
##
## fold 2
## Observations in test set: 22
##                       12    21   22     30   42   49    76   81      96   117
## Predicted           30.3 27.81 21.0 23.178 13.2 27.5 27.93 25.4 45.5388  18.7
## cvpred              29.0 27.37 20.8 22.961 12.4 27.3 27.39 24.9 45.0173  19.4
## Survey_occupancy    45.0 22.50 22.5 22.500 22.5 22.5 22.50 45.0 45.0000   0.0
## CV residual         16.0 -4.87  1.7 -0.461 10.1 -4.8 -4.89 20.1 -0.0173 -19.4
##                      121   123   125   135   136   140   148   171   189
## Predicted           44.3 23.58 18.88  32.1  11.4 15.48  15.8  34.4  29.0
```

```
## cvpred           45.3 24.18 20.19  33.5  12.3 17.16  17.0  37.1  31.1
## Survey_occupancy 67.5 22.50 22.50  22.5   0.0 22.50   0.0   0.0   0.0
## CV residual      22.2 -1.68  2.31 -11.0 -12.3  5.34 -17.0 -37.1 -31.1
##                    190   199   205
## Predicted         57.3  49.1  32.4
## cvpred            59.5  51.0  35.4
## Survey_occupancy  40.0  40.0   0.0
## CV residual      -19.5 -11.0 -35.4
##
## Sum of squares = 6393    Mean square = 291    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2      8     13   19    20    40    48    54
## Predicted          8.61 16.65   9.33   8.95 28.6 14.79 14.94 29.19 19.55
## cvpred            10.47 16.87  11.15  10.79 27.4 14.43 15.94 29.35 20.28
## Survey_occupancy   0.00 22.50   0.00   0.00 45.0 22.50 22.50 22.50 22.50
## CV residual      -10.47  5.63 -11.15 -10.79 17.6  8.07  6.56 -6.85  2.22
##                      55     73    79    83    87   95   100   131   147
## Predicted         32.76   8.67  6.79 15.34  15.7 35.4 21.60 25.41 141.2
## cvpred            31.45  10.71  7.95 15.99  17.3 34.0 22.19 24.72 134.5
## Survey_occupancy 22.50   0.00  0.00 22.50   0.0 45.0 22.50 22.50 160.0
## CV residual      -8.95 -10.71 -7.95  6.51 -17.3 11.0  0.31 -2.22  25.5
##                    167   174   182   191
## Predicted         33.24 43.69  18.1  14.5
## cvpred            33.34 43.35  20.4  17.1
## Survey_occupancy 40.00 40.00   0.0   0.0
## CV residual       6.66 -3.35 -20.4 -17.1
##
## Sum of squares = 2994    Mean square = 136    n = 22
##
## fold 4
## Observations in test set: 22
##                        3   11    17    18    27    45    57       69    82
## Predicted         10.02 14.0 27.06  11.5  17.5  16.4 38.89 25.24231 11.91
## cvpred             9.45 11.2 26.56  10.8  21.7  19.7 38.38 22.49103  9.72
## Survey_occupancy  0.00 22.5 22.50   0.0   0.0   0.0 45.00 22.50000 67.50
## CV residual      -9.45 11.3 -4.06 -10.8 -21.7 -19.7  6.62  0.00897 57.78
##                     103   107   110   127   134   145   154  195  203
## Predicted         24.091  51.1 69.72 19.27 12.49  79.8 72.45 52.3 53.1
## cvpred            22.646  56.3 66.25 17.51  9.56  71.3 70.26 45.5 44.7
## Survey_occupancy 22.500  22.5 67.50 22.50 22.50 120.0 80.00 80.0 80.0
## CV residual      -0.146 -33.8  1.25  4.99 12.94  48.7  9.74 34.5 35.3
##                    204   206   208   210
## Predicted         45.80  7.18 10.17  10.0
## cvpred            44.82  5.18  7.87  12.6
## Survey_occupancy 40.00 40.00  0.00   0.0
## CV residual      -4.82 34.82 -7.87 -12.6
##
## Sum of squares = 12286    Mean square = 558    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33     47   53   60    70    75    86   91    92
```

```
## Predicted        15.23 28.83 23.157 26.9 32.7 22.47  19.7  34.9 42.2  19.3
## cvpred           15.59 29.15 22.104 25.8 31.3 21.27  20.9  36.9 39.8  20.8
## Survey_occupancy 22.50 22.50 22.500 45.0 45.0 22.50   0.0  22.5 67.5   0.0
## CV residual       6.91 -6.65  0.396 19.2 13.7  1.23 -20.9 -14.4 27.7 -20.8
##                     98   106    114  118  139   141  142  158   168   176
## Predicted        13.81 65.85  4.777 28.2 14.7  7.74 17.7 29.7  50.1  55.0
## cvpred           12.61 65.74 -0.962 25.9 12.5  5.67 15.5 29.6  52.3  57.1
## Survey_occupancy 22.50 67.50 22.500 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual       9.89  1.76 23.462 19.1 32.5 -5.67 29.5 10.4 -12.3 -17.1
##                    202   213
## Predicted         16.4  8.20
## cvpred            17.3  7.08
## Survey_occupancy   0.0  0.00
## CV residual      -17.3 -7.08
##
## Sum of squares = 6367    Mean square = 289    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85   126   128    137
## Predicted        17.5  12.1 24.33  45.8 26.82 41.7 39.53  12.9   9.91
## cvpred           17.5  11.7 25.03  48.3 30.09 39.5 37.23  13.4  10.59
## Survey_occupancy 22.5   0.0 22.50  22.5 22.50 67.5 45.00   0.0   0.00
## CV residual       5.0 -11.7 -2.53 -25.8 -7.59 28.0  7.77 -13.4 -10.59
##                    143   151  156  157   159   169   170   172  173  184
## Predicted         12.1  26.1 30.0 46.8  81.6 48.57 45.65 80.41 54.9 45.4
## cvpred            12.5  23.4 28.1 46.3  83.9 44.69 43.99 81.56 51.5 39.5
## Survey_occupancy   0.0   0.0 40.0 80.0  40.0 40.00 40.00 80.00 80.0 80.0
## CV residual      -12.5 -23.4 11.9 33.7 -43.9 -4.69 -3.99 -1.56 28.5 40.5
##                    197   200   207
## Predicted        41.8  9.59 11.82
## cvpred           38.0  5.74  8.14
## Survey_occupancy 80.0  0.00 80.00
## CV residual      42.0 -5.74 71.86
##
## Sum of squares = 15388    Mean square = 699    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99   101
## Predicted         24.0 28.3  15.1 26.5  28.2  45.7 29.5 21.64 21.12 64.77
## cvpred            25.2 28.1  14.9 27.5  29.7  47.8 30.2 19.54 19.68 64.11
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -25.2 16.9 -14.9 17.5 -29.7 -25.3 14.8  2.96  2.82  3.39
##                     104   111   120  130   132   144  146   153   166   175
## Predicted        42.82 18.73 17.61 39.1 15.64 15.87 30.6  12.9 32.67 13.36
## cvpred           41.65 17.71 17.07 39.7 15.28 15.51 29.8  11.3 30.18  9.99
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.00 40.00
## CV residual       3.35  4.79  5.43 27.8  7.22  6.99 10.2 -11.3  9.82 30.01
##                    185   214
## Predicted         13.2 10.23
## cvpred            10.8  8.66
## Survey_occupancy  40.0  0.00
## CV residual       29.2 -8.66
```

```
##
## Sum of squares = 6314    Mean square = 287    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38   51    63    74   102   109   122    129
## Predicted         11.9  21.2 37.2 13.55  7.16 38.32  6.32  32.1   9.22
## cvpred            13.4  22.3 36.9 12.71  9.38 38.79  8.49  32.5  11.08
## Survey_occupancy   0.0   0.0 45.0 22.50  0.00 45.00  0.00  22.5   0.00
## CV residual      -13.4 -22.3  8.1  9.79 -9.38  6.21 -8.49 -10.0 -11.08
##                     162   164   178   179   186  188   192   196   201
## Predicted         43.6  54.1  54.5  48.6  47.2 56.8  51.4  16.7  6.56
## cvpred            45.5  58.6  59.1  53.2  52.3 58.2  52.3  17.2  7.17
## Survey_occupancy   0.0  40.0  40.0  40.0  40.0 80.0  40.0   0.0  0.00
## CV residual      -45.5 -18.6 -19.1 -13.2 -12.3 21.8 -12.3 -17.2 -7.17
##                     209  212   215
## Predicted         6.76 15.1  44.7
## cvpred            7.37 15.7  49.8
## Survey_occupancy  0.00 40.0   0.0
## CV residual      -7.37 24.3 -49.8
##
## Sum of squares = 8470    Mean square = 403    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97  115   116
## Predicted          26.68 21.03 26.17 16.99  18.7  39.5 28.53 19.7 69.1  15.2
## cvpred             24.91 19.57 27.74 17.75  20.4  41.8 29.65 16.8 74.7  20.7
## Survey_occupancy   22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.5   0.0
## CV residual        -2.41  2.93 -5.24  4.75 -20.4 -19.3 -7.15 50.7 -7.2 -20.7
##                      119   124  152  160  163   177   187   193   194   198
## Predicted           21.2 33.66 60.3 10.9 51.9  71.4  13.5 100.5 38.85 77.29
## cvpred              21.8 35.34 62.2  9.9 50.1  73.3  15.2 111.9 41.24 86.63
## Survey_occupancy     0.0 45.00 80.0  0.0 80.0  40.0   0.0  40.0 40.00 80.00
## CV residual        -21.8  9.66 17.8 -9.9 29.9 -33.3 -15.2 -71.9 -1.24 -6.63
##                     216
## Predicted          6.51
## cvpred             6.38
## Survey_occupancy   0.00
## CV residual       -6.38
##
## Sum of squares = 12423    Mean square = 592    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23   31    36   39    44   46    50    59
## Predicted          27.4 15.22  13.3 18.7  19.6 13.5  9.68 39.0 16.39 13.61
## cvpred             26.7 14.56  15.9 19.4  20.3 11.3  7.31 37.1 13.89 13.89
## Survey_occupancy   45.0 22.50   0.0 22.5   0.0 22.5  0.00 67.5 22.50 22.50
## CV residual        18.3  7.94 -15.9  3.1 -20.3 11.2 -7.31 30.4  8.61  8.61
##                       65    78    88   113   133   150   155  161   180  181
## Predicted          17.00  8.77  10.9 25.92  6.68  52.6  13.2 27.1  14.5 45.8
## cvpred             15.36  9.83  10.4 25.91  5.27  53.0  14.6 20.7  17.5 42.5
## Survey_occupancy   22.50  0.00   0.0 22.50 22.50  40.0   0.0 80.0   0.0 80.0
```

```
## CV residual       7.14 -9.83 -10.4 -3.41 17.23 -13.0 -14.6 59.3 -17.5 37.5
##                   183
## Predicted        66.8
## cvpred           59.9
## Survey_occupancy 80.0
## CV residual      20.1
##
## Sum of squares = 8911    Mean square = 424    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 388
```

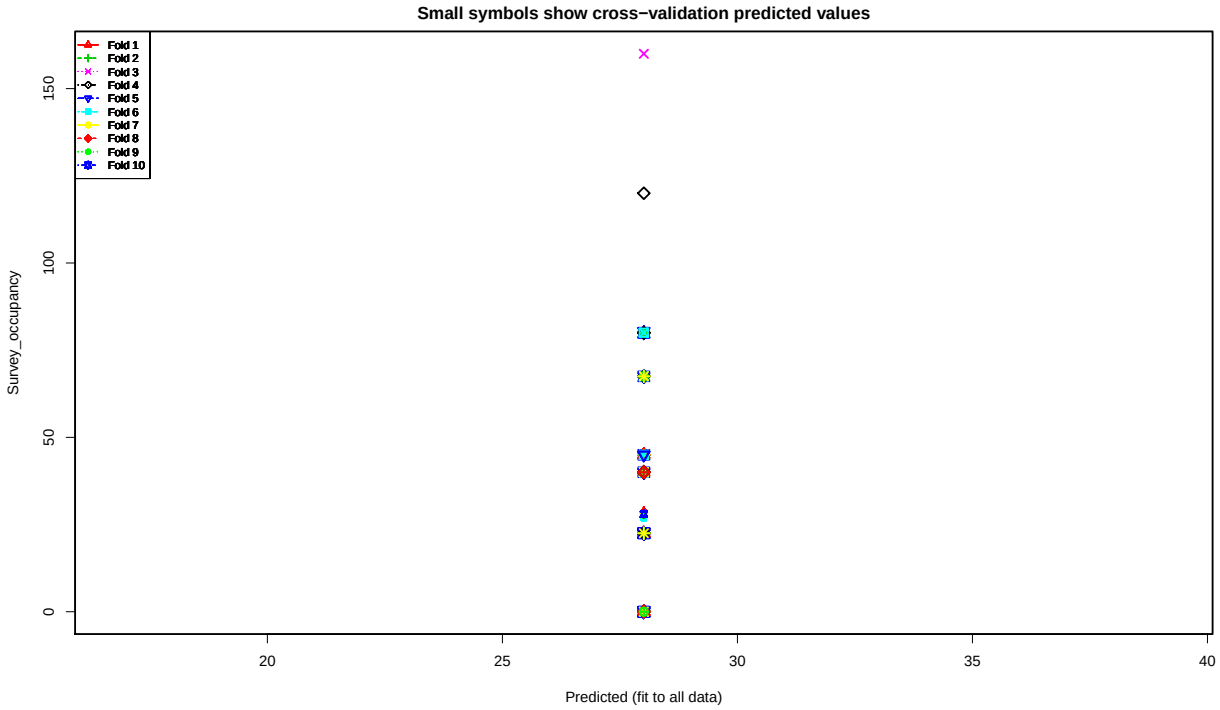
Models	MSE
Survey_occupancy ~ 1	`attr(null.model, "ms")`
Survey_occupancy ~ Wifi_Average_logs	`attr(lm.avg, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Room	`attr(lm.avg.room, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Factor_Time	`attr(lm.avg.time, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Course_Level	`attr(lm.avg.level, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Room + Factor_Time	`attr(lm.avg.room.time, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Room + Course_Level	`attr(lm.avg.room.level, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Factor_Time + Course_Level	`attr(lm.avg.time.level, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Room + Factor_Time + Course_Level	`attr(lm.avg.full, "ms")`

As you can see from the table the model with the lowest MSE was the model with only the Wifi average logs as response variable.

CASE 2: Wi-Fi Maximum logs

We run the same models with the max WiFi logs as response variable, in order to see if it was a better predictor than the average WiFi logs.

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##            Df Sum Sq Mean Sq F value Pr(>F)
## Residuals 215 151981     707
```




```
##
## fold 1
## Observations in test set: 21
##                       4     6    24    25   28    34    35    56   67    72
## Predicted         28.0  28.0 28.01 28.01 28.0 28.01 28.01  28.0 28.0 28.01
## cvpred            28.9  28.9 28.88 28.88 28.9 28.88 28.88  28.9 28.9 28.88
## Survey_occupancy   0.0   0.0 22.50 22.50 45.0 22.50 22.50   0.0 45.0 22.50
## CV residual      -28.9 -28.9 -6.38 -6.38 16.1 -6.38 -6.38 -28.9 16.1 -6.38
##                      80    89   90    94  105   108   112   138  149  165
## Predicted         28.0  28.0 28.0 28.01 28.0 28.01  28.0  28.0 28.0 28.0
## cvpred            28.9  28.9 28.9 28.88 28.9 28.88  28.9  28.9 28.9 28.9
## Survey_occupancy   0.0   0.0 45.0 22.50 45.0 22.50   0.0   0.0 40.0 40.0
## CV residual      -28.9 -28.9 16.1 -6.38 16.1 -6.38 -28.9 -28.9 11.1 11.1
##                     211
## Predicted         28.0
## cvpred            28.9
## Survey_occupancy   0.0
## CV residual      -28.9
##
## Sum of squares = 8246    Mean square = 393    n = 21
##
## fold 2
## Observations in test set: 22
##                       12    21    22    30    42    49    76   81   96   117
## Predicted         28.0 28.01 28.01 28.01 28.01 28.01 28.01 28.0 28.0  28.0
## cvpred            28.6 28.57 28.57 28.57 28.57 28.57 28.57 28.6 28.6  28.6
## Survey_occupancy 45.0 22.50 22.50 22.50 22.50 22.50 22.50 45.0 45.0   0.0
## CV residual      16.4 -6.07 -6.07 -6.07 -6.07 -6.07 -6.07 16.4 16.4 -28.6
##                     121   123   125   135   136   140   148   171   189  190
## Predicted         28.0 28.01 28.01 28.01  28.0 28.01  28.0  28.0  28.0 28.0
```

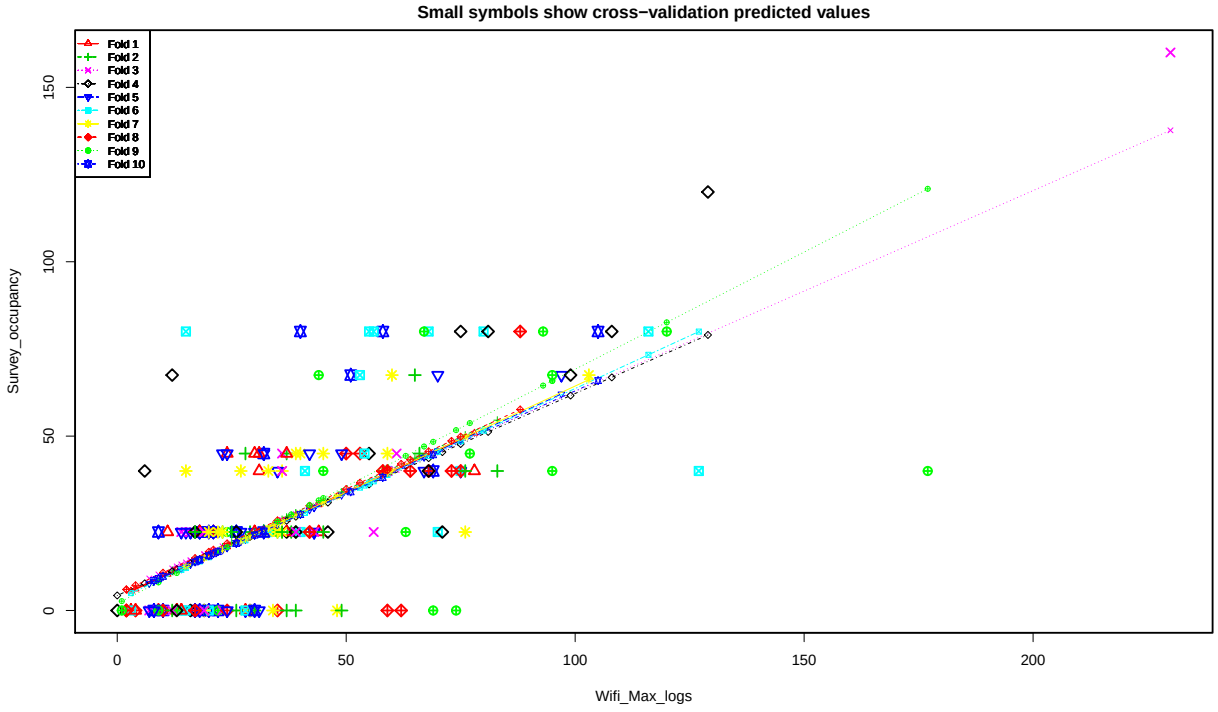
```
## cvpred           28.6 28.57 28.57 28.57  28.6 28.57  28.6  28.6  28.6 28.6
## Survey_occupancy 67.5 22.50 22.50 22.50   0.0 22.50   0.0   0.0   0.0 40.0
## CV residual      38.9 -6.07 -6.07 -6.07 -28.6 -6.07 -28.6 -28.6 -28.6 11.4
##                   199   205
## Predicted        28.0  28.0
## cvpred           28.6  28.6
## Survey_occupancy 40.0   0.0
## CV residual      11.4 -28.6
##
## Sum of squares = 7852    Mean square = 357    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     8    13   19    20    40    48    54
## Predicted         28.0 28.01  28.0  28.0 28.0 28.01 28.01 28.01 28.01
## cvpred            28.4 28.44  28.4  28.4 28.4 28.44 28.44 28.44 28.44
## Survey_occupancy   0.0 22.50   0.0   0.0 45.0 22.50 22.50 22.50 22.50
## CV residual      -28.4 -5.94 -28.4 -28.4 16.6 -5.94 -5.94 -5.94 -5.94
##                     55    73    79    83    87   95   100   131   147  167
## Predicted        28.01  28.0  28.0 28.01  28.0 28.0 28.01 28.01  28.0 28.0
## cvpred           28.44  28.4  28.4 28.44  28.4 28.4 28.44 28.44  28.4 28.4
## Survey_occupancy 22.50   0.0   0.0 22.50   0.0 45.0 22.50 22.50 160.0 40.0
## CV residual      -5.94 -28.4 -28.4 -5.94 -28.4 16.6 -5.94 -5.94 131.6 11.6
##                   174   182   191
## Predicted        28.0  28.0  28.0
## cvpred           28.4  28.4  28.4
## Survey_occupancy 40.0   0.0   0.0
## CV residual      11.6 -28.4 -28.4
##
## Sum of squares = 24912    Mean square = 1132    n = 22
##
## fold 4
## Observations in test set: 22
##                      3    11    17    18    27    45   57    69   82   103
## Predicted         28.0 28.01 28.01  28.0  28.0  28.0 28.0 28.01 28.0 28.01
## cvpred            27.2 27.18 27.18  27.2  27.2  27.2 27.2 27.18 27.2 27.18
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.0 22.50 67.5 22.50
## CV residual      -27.2 -4.68 -4.68 -27.2 -27.2 -27.2 17.8 -4.68 40.3 -4.68
##                    107  110   127   134   145  154  195  203  204  206
## Predicted        28.01 28.0 28.01 28.01  28.0 28.0 28.0 28.0 28.0 28.0
## cvpred           27.18 27.2 27.18 27.18  27.2 27.2 27.2 27.2 27.2 27.2
## Survey_occupancy 22.50 67.5 22.50 22.50 120.0 80.0 80.0 80.0 40.0 40.0
## CV residual      -4.68 40.3 -4.68 -4.68  92.8 52.8 52.8 52.8 12.8 12.8
##                    208   210
## Predicted         28.0  28.0
## cvpred            27.2  27.2
## Survey_occupancy   0.0   0.0
## CV residual      -27.2 -27.2
##
## Sum of squares = 25470    Mean square = 1158    n = 22
##
## fold 5
## Observations in test set: 22
##                      7   33   47   53   60   70    75   86   91    92   98
```

```
## Predicted        28.0 28.0 28.0 28.0 28.0 28.0  28.0 28.0 28.0  28.0 28.0
## cvpred           27.9 27.9 27.9 27.9 27.9 27.9  27.9 27.9 27.9  27.9 27.9
## Survey_occupancy 22.5 22.5 22.5 45.0 45.0 22.5   0.0 22.5 67.5   0.0 22.5
## CV residual      -5.4 -5.4 -5.4 17.1 17.1 -5.4 -27.9 -5.4 39.6 -27.9 -5.4
##                   106  114  118  139   141  142  158  168  176   202   213
## Predicted        28.0 28.0 28.0 28.0  28.0 28.0 28.0 28.0 28.0  28.0  28.0
## cvpred           27.9 27.9 27.9 27.9  27.9 27.9 27.9 27.9 27.9  27.9  27.9
## Survey_occupancy 67.5 22.5 45.0 45.0   0.0 45.0 40.0 40.0 40.0   0.0   0.0
## CV residual      39.6 -5.4 17.1 17.1 -27.9 17.1 12.1 12.1 12.1 -27.9 -27.9
##
## Sum of squares = 9134    Mean square = 415    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85  126   128   137   143
## Predicted        28.01  28.0 28.01 28.01 28.01 28.0 28.0  28.0  28.0  28.0
## cvpred           26.84  26.8 26.84 26.84 26.84 26.8 26.8  26.8  26.8  26.8
## Survey_occupancy 22.50   0.0 22.50 22.50 22.50 67.5 45.0   0.0   0.0   0.0
## CV residual      -4.34 -26.8 -4.34 -4.34 -4.34 40.7 18.2 -26.8 -26.8 -26.8
##                    151  156  157  159  169  170  172  173  184  197   200
## Predicted         28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0 28.0  28.0
## cvpred            26.8 26.8 26.8 26.8 26.8 26.8 26.8 26.8 26.8 26.8  26.8
## Survey_occupancy   0.0 40.0 80.0 40.0 40.0 40.0 80.0 80.0 80.0 80.0   0.0
## CV residual      -26.8 13.2 53.2 13.2 13.2 13.2 53.2 53.2 53.2 53.2 -26.8
##                   207
## Predicted        28.0
## cvpred           26.8
## Survey_occupancy 80.0
## CV residual      53.2
##
## Sum of squares = 24028    Mean square = 1092    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99  101
## Predicted         28.0 28.0  28.0 28.0  28.0 28.01 28.0 28.01 28.01 28.0
## cvpred            27.9 27.9  27.9 27.9  27.9 27.93 27.9 27.93 27.93 27.9
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0 22.50 45.0 22.50 22.50 67.5
## CV residual      -27.9 17.1 -27.9 17.1 -27.9 -5.43 17.1 -5.43 -5.43 39.6
##                   104   111   120  130   132   144  146   153  166  175
## Predicted        28.0 28.01 28.01 28.0 28.01 28.01 28.0  28.0 28.0 28.0
## cvpred           27.9 27.93 27.93 27.9 27.93 27.93 27.9  27.9 27.9 27.9
## Survey_occupancy 45.0 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual      17.1 -5.43 -5.43 39.6 -5.43 -5.43 12.1 -27.9 12.1 12.1
##                   185   214
## Predicted        28.0  28.0
## cvpred           27.9  27.9
## Survey_occupancy 40.0   0.0
## CV residual      12.1 -27.9
##
## Sum of squares = 8987    Mean square = 408    n = 22
##
## fold 8
## Observations in test set: 21
```

```
##                     16    38   51    63    74  102   109   122   129   162
## Predicted         28.0  28.0 28.0 28.01  28.0 28.0  28.0 28.01  28.0  28.0
## cvpred            28.7  28.7 28.7 28.69  28.7 28.7  28.7 28.69  28.7  28.7
## Survey_occupancy   0.0   0.0 45.0 22.50   0.0 45.0   0.0 22.50   0.0   0.0
## CV residual      -28.7 -28.7 16.3 -6.19 -28.7 16.3 -28.7 -6.19 -28.7 -28.7
##                    164  178  179  186  188  192   196   201   209  212
## Predicted         28.0 28.0 28.0 28.0 28.0 28.0  28.0  28.0  28.0 28.0
## cvpred            28.7 28.7 28.7 28.7 28.7 28.7  28.7  28.7  28.7 28.7
## Survey_occupancy 40.0 40.0 40.0 40.0 80.0 40.0   0.0   0.0   0.0 40.0
## CV residual      11.3 11.3 11.3 11.3 51.3 11.3 -28.7 -28.7 -28.7 11.3
##                    215
## Predicted         28.0
## cvpred            28.7
## Survey_occupancy   0.0
## CV residual      -28.7
##
## Sum of squares = 12241    Mean square = 583    n = 21
##
## fold 9
## Observations in test set: 21
##                      26    32    41    43    52    71    84   97  115   116
## Predicted         28.01 28.01 28.01 28.01  28.0 28.01 28.01 28.0 28.0  28.0
## cvpred            27.56 27.56 27.56 27.56  27.6 27.56 27.56 27.6 27.6  27.6
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0 22.50 22.50 67.5 67.5   0.0
## CV residual      -5.06 -5.06 -5.06 -5.06 -27.6 -5.06 -5.06 39.9 39.9 -27.6
##                    119  124  152   160  163  177   187  193  194  198
## Predicted         28.0 28.0 28.0  28.0 28.0 28.0  28.0 28.0 28.0 28.0
## cvpred            27.6 27.6 27.6  27.6 27.6 27.6  27.6 27.6 27.6 27.6
## Survey_occupancy   0.0 45.0 80.0   0.0 80.0 40.0   0.0 40.0 40.0 80.0
## CV residual      -27.6 17.4 52.4 -27.6 52.4 12.4 -27.6 12.4 12.4 52.4
##                    216
## Predicted         28.0
## cvpred            27.6
## Survey_occupancy   0.0
## CV residual      -27.6
##
## Sum of squares = 16919    Mean square = 806    n = 21
##
## fold 10
## Observations in test set: 21
##                      10    14    23    31    36    39    44   46    50    59
## Predicted         28.0 28.01  28.0 28.01  28.0 28.01  28.0 28.0 28.01 28.01
## cvpred            28.1 28.09  28.1 28.09  28.1 28.09  28.1 28.1 28.09 28.09
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual      16.9 -5.59 -28.1 -5.59 -28.1 -5.59 -28.1 39.4 -5.59 -5.59
##                     65    78    88   113   133  150   155  161   180  181
## Predicted         28.01  28.0  28.0 28.01 28.01 28.0  28.0 28.0  28.0 28.0
## cvpred            28.09  28.1  28.1 28.09 28.09 28.1  28.1 28.1  28.1 28.1
## Survey_occupancy 22.50   0.0   0.0 22.50 22.50 40.0   0.0 80.0   0.0 80.0
## CV residual      -5.59 -28.1 -28.1 -5.59 -5.59 11.9 -28.1 51.9 -28.1 51.9
##                    183
## Predicted         28.0
## cvpred            28.1
## Survey_occupancy 80.0
```

```
## CV residual      51.9
##
## Sum of squares = 15838    Mean square = 754    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 711
```

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879     208 <2e-16 ***
## Residuals     214  77103     360
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6    24    25   28    34    35    56   67   72
## Wifi_Max_logs       3.00  14.0 34.00 21.00 31.0 44.00 18.00  9.00 24.0 11.0
## cvpred              5.57  12.2 24.28 16.43 22.5 30.31 14.62  9.19 18.2 10.4
## Survey_occupancy    0.00   0.0 22.50 22.50 45.0 22.50 22.50  0.00 45.0 22.5
## CV residual        -5.57 -12.2 -1.78  6.07 22.5 -7.81  7.88 -9.19 26.8 12.1
##                       80    89   90    94  105    108   112   138  149   165
## Wifi_Max_logs       13.0  13.0 30.0 37.00 37.0 30.000  28.0  14.0 31.0  78.0
## cvpred              11.6  11.6 21.9 26.09 26.1 21.862  20.7  12.2 22.5  50.8
## Survey_occupancy     0.0   0.0 45.0 22.50 45.0 22.500   0.0   0.0 40.0  40.0
## CV residual        -11.6 -11.6 23.1 -3.59 18.9  0.638 -20.7 -12.2 17.5 -10.8
```

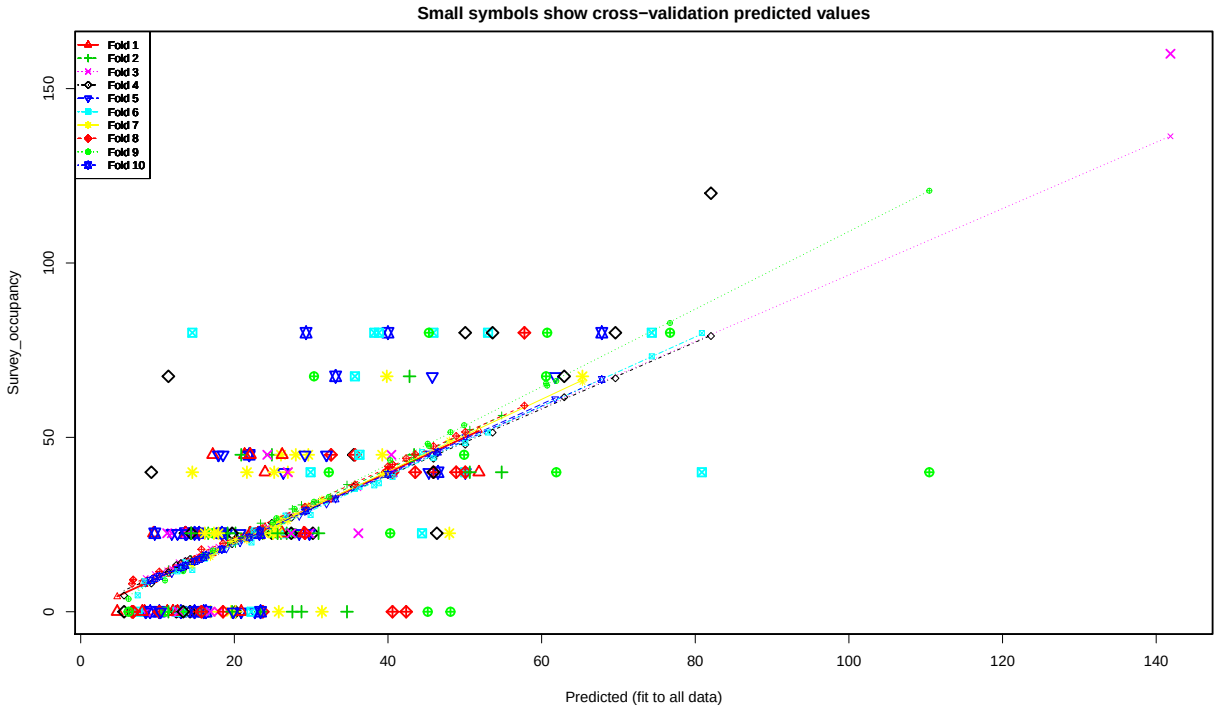
```
##                    211
## Wifi_Max_logs     4.00
## cvpred            6.17
## Survey_occupancy  0.00
## CV residual      -6.17
##
## Sum of squares = 4012    Mean square = 191    n = 21
##
## fold 2
## Observations in test set: 22
##                     12    21    22    30     42    49    76   81     96 117
## Wifi_Max_logs    37.0 39.00 23.00 32.00 29.000 35.00 38.00 28.0 66.000  26
## cvpred           26.7 27.91 18.22 23.67 21.856 25.49 27.31 21.2 44.271  20
## Survey_occupancy 45.0 22.50 22.50 22.50 22.500 22.50 22.50 45.0 45.000   0
## CV residual      18.3 -5.41  4.28 -1.17  0.644 -2.99 -4.81 23.8  0.729 -20
##                    121  123   125   135   136   140   148   171 189   190
## Wifi_Max_logs    65.0 36.0 25.00 45.00  12.0 17.00  30.0  37.0  49  83.0
## cvpred           43.7 26.1 19.43 31.55  11.6 14.59  22.5  26.7  34  54.6
## Survey_occupancy 67.5 22.5 22.50 22.50   0.0 22.50   0.0   0.0   0  40.0
## CV residual      23.8 -3.6  3.07 -9.05 -11.6  7.91 -22.5 -26.7 -34 -14.6
##                    199   205
## Wifi_Max_logs     76.0  39.0
## cvpred            50.3  27.9
## Survey_occupancy  40.0   0.0
## CV residual      -10.3 -27.9
##
## Sum of squares = 5721    Mean square = 260    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     8    13   19    20   40    48   54    55
## Wifi_Max_logs     21.0 15.00  13.0  16.0 36.0 14.00 19.0 38.00 19.0  56.0
## cvpred            17.2 13.79  12.6  14.4 25.9 13.21 16.1 27.04 16.1  37.4
## Survey_occupancy   0.0 22.50   0.0   0.0 45.0 22.50 22.5 22.50 22.5  22.5
## CV residual      -17.2  8.71 -12.6 -14.4 19.1  9.29  6.4 -4.54  6.4 -14.9
##                      73    79    83    87   95   100   131   147  167
## Wifi_Max_logs      9.0  7.00 16.00  23.0 61.0 43.00 39.00 230.0 36.0
## cvpred            10.3  9.18 14.37  18.4 40.3 29.93 27.62 137.7 25.9
## Survey_occupancy   0.0  0.00 22.50   0.0 45.0 22.50 22.50 160.0 40.0
## CV residual      -10.3 -9.18  8.13 -18.4  4.7 -7.43 -5.12  22.3 14.1
##                     174   182   191
## Wifi_Max_logs    59.000  19.0  12.0
## cvpred           39.146  16.1  12.1
## Survey_occupancy 40.000   0.0   0.0
## CV residual       0.854 -16.1 -12.1
##
## Sum of squares = 3317    Mean square = 151    n = 22
##
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45    57    69   82
## Wifi_Max_logs     29.0 18.00 46.00  17.0  19.0  16.0 55.00 37.00 12.0
## cvpred            21.1 14.73 30.94  14.2  15.3  13.6 36.16 25.73 11.3
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.00 22.50 67.5
```

```
## CV residual      -21.1  7.77 -8.44 -14.2 -15.3 -13.6  8.84 -3.23 56.2
##                    103   107   110   127   134 145   154  195  203   204
## Wifi_Max_logs    26.00  71.0 99.00 39.00 17.00 129 108.0 75.0 81.0 68.00
## cvpred           19.36  45.4 61.64 26.89 14.15  79  66.8 47.7 51.2 43.68
## Survey_occupancy 22.50  22.5 67.50 22.50 22.50 120  80.0 80.0 80.0 40.00
## CV residual       3.14 -22.9  5.86 -4.39  8.35  41  13.2 32.3 28.8 -3.68
##                    206   208   210
## Wifi_Max_logs     6.00  13.0  0.00
## cvpred            7.78  11.8  4.31
## Survey_occupancy 40.00   0.0  0.00
## CV residual      32.22 -11.8 -4.31
##
## Sum of squares = 10039    Mean square = 456    n = 22
##
## fold 5
## Observations in test set: 22
##                      7    33    47   53   60     70    75    86   91    92
## Wifi_Max_logs    15.00 43.00 27.00 32.0 49.0 30.000  31.0 43.00 70.0  28.0
## cvpred           12.54 29.45 19.79 22.8 33.1 21.599  22.2 29.45 45.8  20.4
## Survey_occupancy 22.50 22.50 22.50 45.0 45.0 22.500   0.0 22.50 67.5   0.0
## CV residual       9.96 -6.95  2.71 22.2 11.9  0.901 -22.2 -6.95 21.7 -20.4
##                    98   106   114  118 139  141  142  158   168   176 202
## Wifi_Max_logs    14.0 97.00 16.00 42.0  24  7.0 23.0 35.0 75.00 67.00  24
## cvpred           11.9 62.08 13.14 28.8  18  7.7 17.4 24.6 48.79 43.95  18
## Survey_occupancy 22.5 67.50 22.50 45.0  45  0.0 45.0 40.0 40.00 40.00   0
## CV residual      10.6  5.42  9.36 16.2  27 -7.7 27.6 15.4 -8.79 -3.95 -18
##                   213
## Wifi_Max_logs     8.00
## cvpred            8.31
## Survey_occupancy  0.00
## CV residual      -8.31
##
## Sum of squares = 4984    Mean square = 227    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9     61    62    64   85   126   128   137
## Wifi_Max_logs    18.00  9.00 33.000  70.0 40.00 53.0 54.00  15.0  14.0
## cvpred           14.06  8.61 23.127  45.5 27.36 35.2 35.83  12.2  11.6
## Survey_occupancy 22.50  0.00 22.500  22.5 22.50 67.5 45.00   0.0   0.0
## CV residual       8.44 -8.61 -0.627 -23.0 -4.86 32.3  9.17 -12.2 -11.6
##                    143   151 156  157 159   169   170    172  173 184  197
## Wifi_Max_logs     20.0  28.0  41 68.0 127 59.00 75.00 116.00 80.0  56 55.0
## cvpred            15.3  20.1  28 44.3  80 38.85 48.53  73.32 51.5  37 36.4
## Survey_occupancy   0.0   0.0  40 80.0  40 40.00 40.00  80.00 80.0  80 80.0
## CV residual      -15.3 -20.1  12 35.7 -40  1.15 -8.53   6.68 28.5  43 43.6
##                    200  207
## Wifi_Max_logs     3.00 15.0
## cvpred            4.98 12.2
## Survey_occupancy  0.00 80.0
## CV residual      -4.98 67.8
##
## Sum of squares = 15053    Mean square = 684    n = 22
##
```

```
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93   99    101
## Wifi_Max_logs     28.0 39.0  29.0 45.0  48.0  76.0 40.0 33.00 22.0 103.00
## cvpred            20.6 27.2  21.2 30.9  32.7  49.8 27.9 23.59 16.9  66.18
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.5  67.50
## CV residual      -20.6 17.8 -21.2 14.1 -32.7 -27.3 17.1 -1.09  5.6   1.32
##                     104   111   120  130   132   144  146   153  166  175
## Wifi_Max_logs    59.00 36.00 35.00 60.0 23.00 20.00 36.0  19.0 33.0 27.0
## cvpred           39.41 25.42 24.81 40.0 17.51 15.69 25.4  15.1 23.6 19.9
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual       5.59 -2.92 -2.31 27.5  4.99  6.81 14.6 -15.1 16.4 20.1
##                     185   214
## Wifi_Max_logs    15.0  34.0
## cvpred           12.6  24.2
## Survey_occupancy 40.0   0.0
## CV residual      27.4 -24.2
##
## Sum of squares = 6843    Mean square = 311    n = 22
##
## fold 8
## Observations in test set: 21
##                       16    38   51    63    74   102   109   122   129 162
## Wifi_Max_logs     20.0  35.0 50.0 21.00  4.00 53.00  24.0 42.00  10.0  62
## cvpred            16.8  25.8 34.8 17.42  7.22 36.63  19.2 30.02  10.8  42
## Survey_occupancy   0.0   0.0 45.0 22.50  0.00 45.00   0.0 22.50   0.0   0
## CV residual      -16.8 -25.8 10.2  5.08 -7.22  8.37 -19.2 -7.52 -10.8 -42
##                     164   178    179   186  188   192 196   201   209
## Wifi_Max_logs    64.00 75.00 59.000 68.00 88.0 73.00  17  2.00  2.00
## cvpred           43.23 49.83 40.226 45.63 57.6 48.63  15  6.02  6.02
## Survey_occupancy 40.00 40.00 40.000 40.00 80.0 40.00   0  0.00  0.00
## CV residual      -3.23 -9.83 -0.226 -5.63 22.4 -8.63 -15 -6.02 -6.02
##                     212   215
## Wifi_Max_logs    58.000  59.0
## cvpred           39.626  40.2
## Survey_occupancy 40.000   0.0
## CV residual       0.374 -40.2
##
## Sum of squares = 6141    Mean square = 292    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97   115
## Wifi_Max_logs    42.00 24.00 38.00 22.00  22.0  63.0 35.00 44.0 95.00
## cvpred           30.22 18.13 27.54 16.79  16.8  44.3 25.52 31.6 65.83
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.50
## CV residual      -7.72  4.37 -5.04  5.71 -16.8 -21.8 -3.02 35.9  1.67
##                     116   119   124  152   160 163   177   187   193   194
## Wifi_Max_logs     74.0  69.0 77.00 93.0  13.0  67  95.0  9.00 177.0 45.00
## cvpred            51.7  48.4 53.73 64.5  10.7  47  65.8  8.06 120.9 32.24
## Survey_occupancy   0.0   0.0 45.00 80.0   0.0  80  40.0  0.00  40.0 40.00
## CV residual      -51.7 -48.4 -8.73 15.5 -10.7  33 -25.8 -8.06 -80.9  7.76
##                     198   216
## Wifi_Max_logs    120.00  1.00
```

```
## cvpred            82.62  2.68
## Survey_occupancy  80.00  0.00
## CV residual       -2.62 -2.68
##
## Sum of squares = 16085    Mean square = 766    n = 21
##
## fold 10
## Observations in test set: 21
##                      10   14    23   31    36    39    44   46    50    59
## Wifi_Max_logs    32.0 18.0  22.0 18.0  20.0 26.00  17.0 51.0 20.00 26.00
## cvpred           22.8 14.5  16.9 14.5  15.7 19.23  13.9 34.0 15.69 19.23
## Survey_occupancy 45.0 22.5   0.0 22.5   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual      22.2  8.0 -16.9  8.0 -15.7  3.27 -13.9 33.5  6.81  3.27
##                      65    78    88    113   133   150   155  161   180
## Wifi_Max_logs    21.00  8.00 10.00 32.000  9.00 69.00  30.0 40.0  18.0
## cvpred           16.28  8.59  9.78 22.777  9.18 44.64  21.6 27.5  14.5
## Survey_occupancy 22.50  0.00  0.00 22.500 22.50 40.00   0.0 80.0   0.0
## CV residual       6.22 -8.59 -9.78 -0.277 13.32 -4.64 -21.6 52.5 -14.5
##                   181   183
## Wifi_Max_logs    58.0 105.0
## cvpred           38.1  65.9
## Survey_occupancy 80.0  80.0
## CV residual      41.9  14.1
##
## Sum of squares = 8325    Mean square = 396    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 373


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879  207.47 <2e-16 ***
## Room            1    228     228    0.63   0.43
## Residuals     213  76875     361
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6      24    25   28    34    35    56    67
## Predicted           4.75  11.3 23.1138 15.41 21.3 29.04 13.64  8.31 17.2
## cvpred              4.28  10.8 22.5375 14.88 20.8 28.43 13.12  7.82 16.6
## Survey_occupancy    0.00   0.0 22.5000 22.50 45.0 22.50 22.50  0.00 45.0
## CV residual        -4.28 -10.8 -0.0375  7.62 24.2 -5.93  9.38 -7.82 28.4
##                       72  80  89    90    94  105    108   112   138  149
## Predicted           9.49  12  12 22.1 26.22 26.2 22.079  20.9  12.6 24.0
## cvpred              9.00  12  12 22.0 26.09 26.1 21.969  20.8  12.5 24.3
## Survey_occupancy   22.50   0   0 45.0 22.50 45.0 22.500   0.0   0.0 40.0
## CV residual        13.50 -12 -12 23.0 -3.59 18.9  0.531 -20.8 -12.5 15.7
##                      165   211
## Predicted           51.8  8.01
## cvpred              52.0  8.45
## Survey_occupancy    40.0  0.00
## CV residual        -12.0 -8.45
##
## Sum of squares = 4187    Mean square = 199    n = 21
##
## fold 2
## Observations in test set: 22
##                       12    21    22    30    42     49    76   81    96
## Predicted          24.9 26.07 16.60 21.93 20.15 23.706 26.82 20.9 43.40
## cvpred             24.1 25.24 15.92 21.16 19.41 22.913 27.36 21.5 43.68
## Survey_occupancy   45.0 22.50 22.50 22.50 22.50 22.500 22.50 45.0 45.00
## CV residual        20.9 -2.74  6.58  1.34  3.09 -0.413 -4.86 23.5  1.32
##                      117   121   123   125   135   136   140   148   171
## Predicted           19.7 42.8 25.63 19.12 30.96  11.4 14.38  23.4  27.6
```

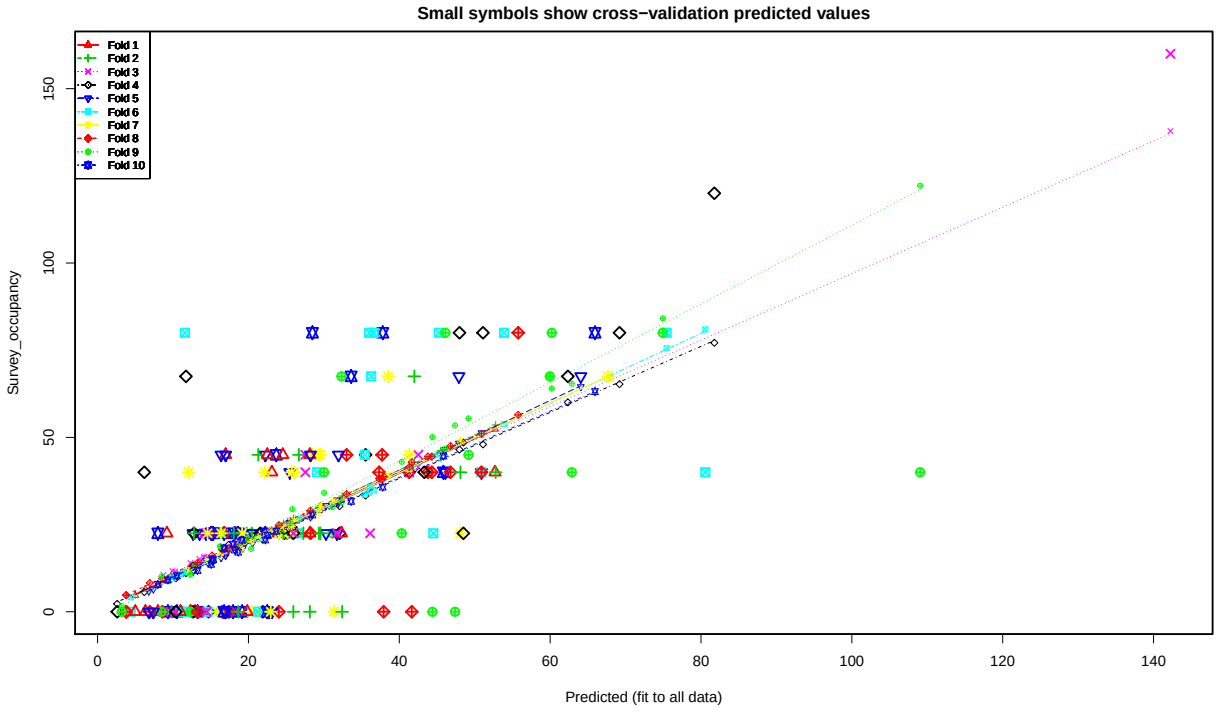
```
## cvpred            20.4 43.1 26.19 19.78 31.44  12.2 15.11  25.4  29.5
## Survey_occupancy   0.0 67.5 22.50 22.50 22.50   0.0 22.50   0.0   0.0
## CV residual      -20.4 24.4 -3.69  2.72 -8.94 -12.2  7.39 -25.4 -29.5
##                    189   190   199   205
## Predicted         34.7  54.8  50.7  28.7
## cvpred            36.5  56.3  52.2  30.6
## Survey_occupancy   0.0  40.0  40.0   0.0
## CV residual      -36.5 -16.3 -12.2 -30.6
##
## Sum of squares = 6585    Mean square = 299    n = 22
##
## fold 3
## Observations in test set: 22
##                      1    2     8    13   19   20    40    48    54    55
## Predicted         15.4 11.9  10.7  12.5 24.3 11.3 14.23 25.48 14.23  36.1
## cvpred            15.8 12.4  11.3  13.0 24.2 11.9 14.67 25.32 14.67  35.4
## Survey_occupancy   0.0 22.5   0.0   0.0 45.0 22.5 22.50 22.50 22.50  22.5
## CV residual      -15.8 10.1 -11.3 -13.0 20.8 10.6  7.83 -2.82  7.83 -12.9
##                     73    79    83    87    95   100  131   147  167
## Predicted          9.64  8.46 13.79  17.9 40.44 29.78 27.4 141.9 27.0
## cvpred            10.79  9.67 14.71  18.6 39.93 29.84 27.6 136.3 27.6
## Survey_occupancy   0.00  0.00 22.50   0.0 45.00 22.50 22.5 160.0 40.0
## CV residual      -10.79 -9.67  7.79 -18.6  5.07 -7.34 -5.1  23.7 12.4
##                    174   182   191
## Predicted        40.587  16.9  12.8
## cvpred           40.525  18.1  14.2
## Survey_occupancy 40.000   0.0   0.0
## CV residual      -0.525 -18.1 -14.2
##
## Sum of squares = 3456    Mean square = 157    n = 22
##
## fold 4
## Observations in test set: 22
##                      3    11    17    18    27    45    57    69   82
## Predicted         20.2 13.64 30.22  13.0  14.2  12.5 35.55 24.89 11.4
## cvpred            20.9 14.53 30.68  13.9  15.1  13.4 35.87 25.49 11.3
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.00 22.50 67.5
## CV residual      -20.9  7.97 -8.18 -13.9 -15.1 -13.4  9.13 -2.99 56.2
##                    103   107  110   127  134   145  154  195  203   204
## Predicted        19.71  46.4 62.9 27.41 14.4  82.0 69.6 50.1 53.6 45.92
## cvpred           19.39  45.4 61.5 26.89 14.2  79.1 66.9 47.9 51.4 43.87
## Survey_occupancy 22.50  22.5 67.5 22.50 22.5 120.0 80.0 80.0 80.0 40.00
## CV residual       3.11 -22.9  6.0 -4.39  8.3  40.9 13.1 32.1 28.6 -3.87
##                    206   208   210
## Predicted         9.20  13.3  5.65
## cvpred            8.11  12.1  4.65
## Survey_occupancy 40.00   0.0  0.00
## CV residual      31.89 -12.1 -4.65
##
## Sum of squares = 9969    Mean square = 453    n = 22
##
## fold 5
## Observations in test set: 22
##                      7    33    47   53   60    70    75   86   91    92
```

```
## Predicted        11.9 28.44 18.97 21.9 32.0 20.74  22.7 29.8 45.8  20.9
## cvpred           11.0 27.39 18.02 20.9 30.9 19.77  22.4 29.4 45.2  20.6
## Survey_occupancy 22.5 22.50 22.50 45.0 45.0 22.50   0.0 22.5 67.5   0.0
## CV residual      11.5 -4.89  4.48 24.1 14.1  2.73 -22.4 -6.9 22.3 -20.6
##                    98   106   114  118  139   141  142  158   168   176
## Predicted        12.6 61.76 13.79 29.2 18.5  8.46 17.9 26.4  50.1 45.33
## cvpred           12.4 61.05 13.57 28.8 18.3  8.30 17.7 26.7  50.2 45.47
## Survey_occupancy 22.5 67.50 22.50 45.0 45.0  0.00 45.0 40.0  40.0 40.00
## CV residual      10.1  6.45  8.93 16.2 26.7 -8.30 27.3 13.3 -10.2 -5.47
##                    202   213
## Predicted         19.9  10.4
## cvpred            20.3  10.9
## Survey_occupancy   0.0   0.0
## CV residual      -20.3 -10.9
##
## Sum of squares = 5285    Mean square = 240    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9     61    62    64   85   126   128   137
## Predicted        13.64  8.31 22.522  44.4 26.67 35.7 36.29  13.2  12.6
## cvpred           14.22  8.76 23.318  45.8 27.56 35.2 35.85  12.2  11.6
## Survey_occupancy 22.50  0.00 22.500  22.5 22.50 67.5 45.00   0.0   0.0
## CV residual       8.28 -8.76 -0.818 -23.3 -5.06 32.3  9.15 -12.2 -11.6
##                    143   151  156  157   159   169   170   172  173  184
## Predicted         16.2  22.2 29.9 45.9  80.9 40.59 50.06 74.34 53.0 38.8
## cvpred            15.2  19.9 27.8 44.1  79.9 38.67 48.37 73.24 51.4 36.8
## Survey_occupancy   0.0   0.0 40.0 80.0  40.0 40.00 40.00 80.00 80.0 80.0
## CV residual      -15.2 -19.9 12.2 35.9 -39.9  1.33 -8.37  6.76 28.6 43.2
##                    197   200  207
## Predicted        38.2  7.42 14.5
## cvpred           36.2  4.71 12.0
## Survey_occupancy 80.0  0.00 80.0
## CV residual      43.8 -4.71 68.0
##
## Sum of squares = 15137    Mean square = 688    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99   101
## Predicted         19.6 26.1  20.2 29.6  31.4  48.0 28.0 23.86 17.34 65.31
## cvpred            20.1 26.8  20.7 30.4  32.2  49.1 27.9 23.63 16.99 65.89
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -20.1 18.2 -20.7 14.6 -32.2 -26.6 17.1 -1.13  5.51  1.61
##                    104   111   120  130   132   144  146   153  166  175
## Predicted        39.25 25.63 25.04 39.8 17.93 16.16 27.0  16.9 25.2 21.6
## cvpred           39.33 25.44 24.83 39.9 17.59 15.78 25.9  15.6 24.1 20.5
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual       5.67 -2.94 -2.33 27.6  4.91  6.72 14.1 -15.6 15.9 19.5
##                    185   214
## Predicted         14.5  25.8
## cvpred            13.2  24.7
## Survey_occupancy  40.0   0.0
## CV residual       26.8 -24.7
```

```
##
## Sum of squares = 6734    Mean square = 306    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38   51    63    74   102   109   122   129
## Predicted         14.8  23.7 32.6 15.41  6.68 35.70  18.5 29.19  10.2
## cvpred            15.0  23.7 32.4 15.57  8.02 36.46  19.6 30.08  11.5
## Survey_occupancy   0.0   0.0 45.0 22.50  0.00 45.00   0.0 22.50   0.0
## CV residual      -15.0 -23.7 12.6  6.93 -8.02  8.54 -19.6 -7.58 -11.5
##                     162   164   178   179   186  188   192   196   201
## Predicted         42.4 43.55  50.1 40.59 45.92 57.8  48.9  15.7  6.83
## cvpred            44.0 45.17  51.6 42.27 47.49 59.1  50.4  17.9  9.18
## Survey_occupancy   0.0 40.00  40.0 40.00 40.00 80.0  40.0   0.0  0.00
## CV residual      -44.0 -5.17 -11.6 -2.27 -7.49 20.9 -10.4 -17.9 -9.18
##                     209   212   215
## Predicted         6.83 40.00  40.6
## cvpred            9.18 41.69  42.3
## Survey_occupancy  0.00 40.00   0.0
## CV residual      -9.18 -1.69 -42.3
##
## Sum of squares = 6686    Mean square = 318    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97   115
## Predicted        27.85 17.19 25.48 16.01  16.0  40.3 25.04 30.4 60.57
## cvpred           29.49 17.52 26.83 16.19  16.2  43.5 25.55 31.5 65.46
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.50
## CV residual      -6.99  4.98 -4.33  6.31 -16.2 -21.0 -3.05 36.0  2.04
##                     116   119   124  152   160  163   177   187   193   194
## Predicted         48.1  45.2 49.91 60.7  13.3 45.3  61.9 10.98 110.5 32.30
## cvpred            51.5  48.2 53.49 64.8  11.6 47.6  66.2  8.98 120.7 32.92
## Survey_occupancy   0.0   0.0 45.00 80.0   0.0 80.0  40.0  0.00  40.0 40.00
## CV residual      -51.5 -48.2 -8.49 15.2 -11.6 32.4 -26.2 -8.98 -80.7  7.08
##                     198   216
## Predicted        76.7  6.24
## cvpred           82.8  3.66
## Survey_occupancy 80.0  0.00
## CV residual      -2.8 -3.66
##
## Sum of squares = 15953    Mean square = 760    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23    31    36    39    44   46   50    59
## Predicted        21.9 13.64  16.0 13.64  14.8 18.38  13.0 33.2 14.8 18.38
## cvpred           21.3 13.24  15.6 13.24  14.4 17.88  12.7 32.3 14.4 17.88
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.50   0.0 67.5 22.5 22.50
## CV residual      23.7  9.26 -15.6  9.26 -14.4  4.62 -12.7 35.2  8.1  4.62
##                      65    78    88    113   133   150   155  161   180
## Predicted        15.41  9.05  10.2 23.263  9.64 46.51  23.4 29.3  16.3
## cvpred           14.98  8.95  10.1 22.847  9.53 45.77  23.2 29.0  16.2
## Survey_occupancy 22.50  0.00   0.0 22.500 22.50 40.00   0.0 80.0   0.0
```

```
## CV residual       7.52 -8.95 -10.1 -0.347 12.97 -5.77 -23.2 51.0 -16.2
##                    181  183
## Predicted         40.0 67.8
## cvpred            39.4 66.6
## Survey_occupancy 80.0 80.0
## CV residual       40.6 13.4
##
## Sum of squares = 8358    Mean square = 398    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 381

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879  205.91 <2e-16 ***
## Factor_Time     3    374     125    0.34   0.79
## Residuals     211  76728     364
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6    24   25   28    34    35    56   67    72
## Predicted         6.33  12.9 26.35 18.6 24.6 32.33 16.77  7.99 17.0  9.19
## cvpred            6.47  13.0 26.06 18.3 24.3 32.04 16.51  7.67 16.6  8.86
## Survey_occupancy  0.00   0.0 22.50 22.5 45.0 22.50 22.50  0.00 45.0 22.50
```

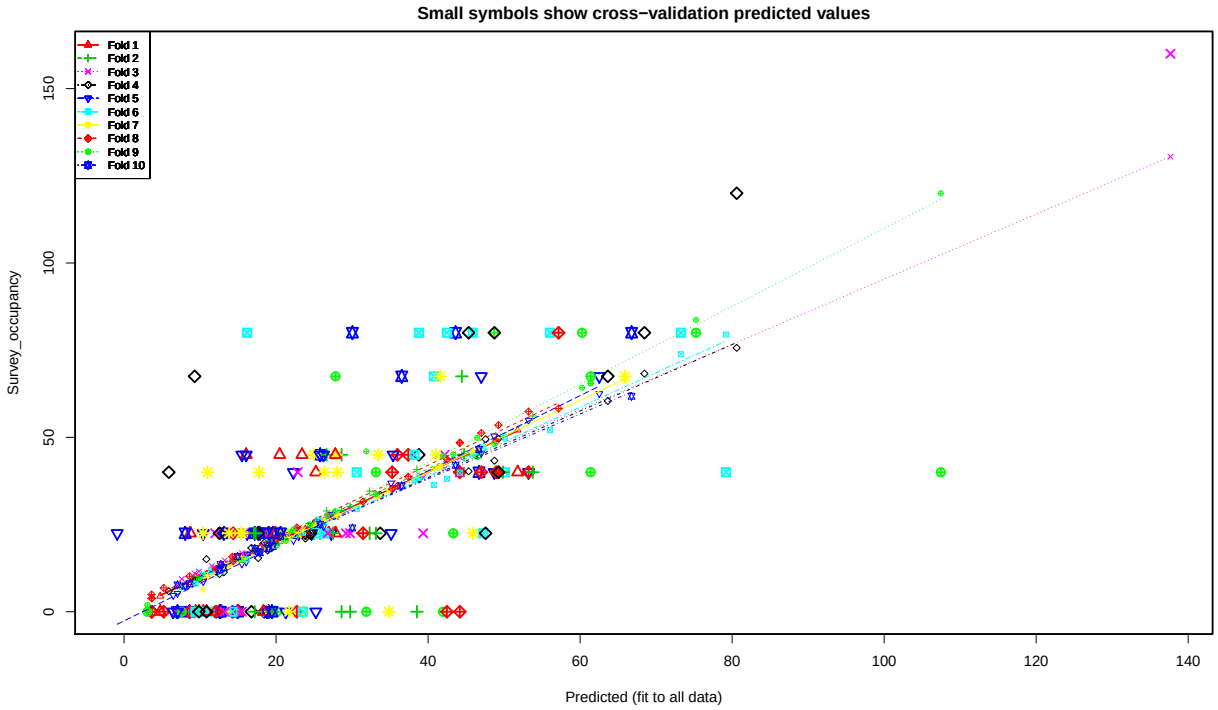
```
## CV residual      -6.47 -13.0 -3.56  4.2 20.7 -9.54  5.99 -7.67 28.4 13.64
##                     80    89   90    94  105   108   112   138  149   165
## Predicted         12.3  12.3 22.5 28.14 28.1 23.95  19.8  11.0 23.1  52.7
## cvpred            12.4  12.4 22.6 27.86 27.9 23.67  20.2  10.7 23.2  52.4
## Survey_occupancy   0.0   0.0 45.0 22.50 45.0 22.50   0.0   0.0 40.0  40.0
## CV residual      -12.4 -12.4 22.4 -5.36 17.1 -1.17 -20.2 -10.7 16.8 -12.4
##                    211
## Predicted         5.00
## cvpred            4.68
## Survey_occupancy  0.00
## CV residual      -4.68
##
## Sum of squares = 3964    Mean square = 189    n = 21
##
## fold 2
## Observations in test set: 22
##                      12    21    22    30   42    49    76   81    96   117
## Predicted         26.7 29.34 19.76 25.15 20.4 24.04 27.29 21.3 45.51  18.6
## cvpred            26.4 30.05 20.46 25.86 21.2 24.79 26.99 21.0 46.25  19.4
## Survey_occupancy 45.0 22.50 22.50 22.50 22.5 22.50 22.50 45.0 45.00   0.0
## CV residual       18.6 -7.55  2.04 -3.36  1.3 -2.29 -4.49 24.0 -1.25 -19.4
##                    121   123  125  135    136   140   148   171   189   190
## Predicted         42.0 24.63 18.0 29.5   9.79 12.78  22.5  28.1  32.4  52.8
## cvpred            42.8 25.39 18.8 30.4  10.61 13.61  22.2  28.9  33.2  53.6
## Survey_occupancy 67.5 22.50 22.5 22.5   0.00 22.50   0.0   0.0   0.0  40.0
## CV residual       24.7 -2.89  3.7 -7.9 -10.61  8.89 -22.2 -28.9 -33.2 -13.6
##                    199   205
## Predicted         48.11  26.0
## cvpred            48.99  26.8
## Survey_occupancy 40.00   0.0
## CV residual       -8.99 -26.8
##
## Sum of squares = 5697    Mean square = 259    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     8    13   19    20    40    48    54
## Predicted          17.1 13.52  12.3  14.1 27.5 14.37 14.46 25.83 14.46
## cvpred             18.5 15.11  14.0  15.7 27.2 14.68 15.55 26.39 15.55
## Survey_occupancy    0.0 22.50   0.0   0.0 45.0 22.50 22.50 22.50 22.50
## CV residual       -18.5  7.39 -14.0 -15.7 17.8  7.82  6.95 -3.89  6.95
##                      55     73     79    83    87    95   100   131   147
## Predicted          36.1   9.92   8.73 14.12  18.3 42.51 31.73 25.95 142.2
## cvpred             35.7  11.69  10.55 15.68  19.7 41.51 31.24 26.01 137.8
## Survey_occupancy   22.5   0.00   0.00 22.50   0.0 45.00 22.50 22.50 160.0
## CV residual       -13.2 -11.69 -10.55  6.82 -19.7  3.49 -8.74 -3.51  22.2
##                    167    174   182   191
## Predicted         27.5 41.314  14.5  10.3
## cvpred            27.2 40.371  15.5  11.6
## Survey_occupancy 40.0 40.000   0.0   0.0
## CV residual       12.8 -0.371 -15.5 -11.6
##
## Sum of squares = 3314    Mean square = 151    n = 22
##
```

```
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45   57     69   82
## Predicted         21.9 15.31 32.08  14.7  17.4  12.7 35.5 24.756 11.7
## cvpred            20.7 14.47 30.28  13.9  19.2  13.2 33.3 23.146 11.1
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.0 22.500 67.5
## CV residual      -20.7  8.03 -7.78 -13.9 -19.2 -13.2 11.7 -0.646 56.4
##                     103   107   110   127  134   145  154  195  203    204
## Predicted        21.556  48.5 62.35 25.95 12.8  81.8 69.2 48.0 51.1 43.316
## cvpred           23.122  48.5 60.05 24.27 11.9  77.1 65.3 46.5 48.0 40.643
## Survey_occupancy 22.500  22.5 67.50 22.50 22.5 120.0 80.0 80.0 80.0 40.000
## CV residual      -0.622 -26.0  7.45 -1.77 10.6  42.9 14.7 33.5 32.0 -0.643
##                    206  208   210
## Predicted         6.20 10.4  2.60
## cvpred            5.65  9.6  2.26
## Survey_occupancy 40.00  0.0  0.00
## CV residual      34.35 -9.6 -2.26
##
## Sum of squares = 10938    Mean square = 497    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53   60   70    75    86   91    92
## Predicted        13.52 31.73 19.25 22.2 31.9 20.6  23.1 30.28 47.9  22.8
## cvpred           13.62 32.11 18.15 21.2 31.1 19.7  23.2 30.44 48.3  23.1
## Survey_occupancy 22.50 22.50 22.50 45.0 45.0 22.5   0.0 22.50 67.5   0.0
## CV residual       8.88 -9.61  4.35 23.8 13.9  2.8 -23.2 -7.94 19.2 -23.1
##                     98   106  114  118  139   141  142  158   168   176
## Predicted        14.37 64.07 12.7 28.2 17.0  6.79 16.4 25.5  50.9 46.10
## cvpred           14.69 64.54 11.5 27.2 16.1  5.89 15.5 25.6  51.3 46.52
## Survey_occupancy 22.50 67.50 22.5 45.0 45.0  0.00 45.0 40.0  40.0 40.00
## CV residual       7.81  2.96 11.0 17.8 28.9 -5.89 29.5 14.4 -11.3 -6.52
##                    202   213
## Predicted         17.0  7.39
## cvpred            16.1  6.49
## Survey_occupancy   0.0  0.00
## CV residual      -16.1 -6.49
##
## Sum of squares = 5390    Mean square = 245    n = 22
##
## fold 6
## Observations in test set: 22
##                       5     9     61    62   64   85  126   128   137   143
## Predicted        15.31  9.92 22.361  44.5 26.6 36.3 35.4  11.6  11.0  14.6
## cvpred           14.93  9.48 22.358  44.8 26.6 36.1 33.6  11.5  10.8  14.5
## Survey_occupancy 22.50  0.00 22.500  22.5 22.5 67.5 45.0   0.0   0.0   0.0
## CV residual       7.57 -9.48  0.142 -22.3 -4.1 31.4 11.4 -11.5 -10.8 -14.5
##                    151  156  157   159   169   170   172  173  184  197
## Predicted         21.3 29.1 45.2  80.6 41.31  50.9 75.44 53.9 36.6 36.0
## cvpred            21.0 28.9 45.2  81.0 41.05  50.7 75.58 53.8 34.8 34.2
## Survey_occupancy   0.0 40.0 80.0  40.0 40.00  40.0 80.00 80.0 80.0 80.0
## CV residual      -21.0 11.1 34.8 -41.0 -1.05 -10.7  4.42 26.2 45.2 45.8
##                    200  207
## Predicted         4.40 11.6
```

```
## cvpred            4.19 11.5
## Survey_occupancy  0.00 80.0
## CV residual      -4.19 68.5
##
## Sum of squares = 15371    Mean square = 699    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99    101
## Predicted         21.3 29.3  20.4 29.5  31.3  48.1 28.5 25.75 19.16 67.658
## cvpred            21.4 28.2  20.2 30.1  32.0  49.0 28.6 24.53 17.85 67.043
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.500
## CV residual      -21.4 16.8 -20.2 14.9 -32.0 -26.5 16.4 -2.03  4.65  0.457
##                     104   111   120  130   132   144  146   153  166  175
## Predicted        41.31 24.63 24.04 38.5 16.37 14.58 26.1  15.9 25.7 22.2
## cvpred           40.32 24.45 23.85 39.3 16.79 14.97 26.2  15.9 24.5 20.9
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual       4.68 -1.95 -1.35 28.2  5.71  7.53 13.8 -15.9 15.5 19.1
##                    185   214
## Predicted        12.1  23.0
## cvpred           11.7  23.5
## Survey_occupancy 40.0   0.0
## CV residual      28.3 -23.5
##
## Sum of squares = 6697    Mean square = 304    n = 22
##
## fold 8
## Observations in test set: 21
##                       16    38   51    63    74  102   109   122   129   162
## Predicted         16.5  24.0 33.0 15.18  6.93 37.7  17.4 28.23  8.59  41.7
## cvpred            17.8  24.8 33.8 16.11  8.26 37.9  18.2 28.99  9.54  42.9
## Survey_occupancy   0.0   0.0 45.0 22.50  0.00 45.0   0.0 22.50  0.00   0.0
## CV residual      -17.8 -24.8 11.2  6.39 -8.26  7.1 -18.2 -6.49 -9.54 -42.9
##                     164   178   179   186  188  192   196   201   209   212
## Predicted        44.31  50.9 41.31 43.79 55.8 46.8  13.3  3.80  3.80 37.33
## cvpred           44.46  51.0 41.48 44.52 56.5 47.5  14.1  4.76  4.76 38.21
## Survey_occupancy 40.00  40.0 40.00 40.00 80.0 40.0   0.0  0.00  0.00 40.00
## CV residual      -4.46 -11.0 -1.48 -4.52 23.5 -7.5 -14.1 -4.76 -4.76  1.79
##                     215
## Predicted         37.9
## cvpred            38.8
## Survey_occupancy   0.0
## CV residual      -38.8
##
## Sum of squares = 6051    Mean square = 288    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97     115
## Predicted        31.14 20.36 25.83 16.25  16.3  40.3 25.49 32.3 59.9586
## cvpred           30.04 18.03 29.42 18.75  18.8  43.0 25.34 31.4 67.4533
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.5000
## CV residual      -7.54  4.47 -6.92  3.75 -18.8 -20.5 -2.84 36.1  0.0467
##                     116   119   124  152   160  163   177    187   193
```

```
## Predicted         47.4  44.4  49.2 60.2  12.3 46.1  62.9   8.47 109.1
## cvpred            53.4  50.1  55.4 64.0  10.7 46.7  65.4  10.08 122.2
## Survey_occupancy   0.0   0.0  45.0 80.0   0.0 80.0  40.0   0.00  40.0
## CV residual      -53.4 -50.1 -10.4 16.0 -10.7 33.3 -25.4 -10.08 -82.2
##                    194   198   216
## Predicted        30.02 74.93  3.20
## cvpred           34.09 84.13  1.63
## Survey_occupancy 40.00 80.00  0.00
## CV residual       5.91 -4.13 -1.63
##
## Sum of squares = 16727    Mean square = 797    n = 21
##
## fold 10
## Observations in test set: 21
##                     10    14    23    31    36   39    44   46    50    59
## Predicted        23.7 15.31  19.2 16.77  18.0 18.6  13.3 33.6 15.05 18.17
## cvpred           23.1 14.95  20.6 18.23  19.4 17.1  11.9 31.7 13.61 17.73
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.5   0.0 67.5 22.50 22.50
## CV residual      21.9  7.55 -20.6  4.27 -19.4  5.4 -11.9 35.8  8.89  4.77
##                     65    78    88  113   133   150   155  161   180  181
## Predicted        15.18  9.33  10.5 22.2  7.99 45.85  22.5 28.5  16.8 37.8
## cvpred           14.82  9.12  10.3 20.6  7.83 44.66  21.9 27.8  18.2 35.7
## Survey_occupancy 22.50  0.00   0.0 22.5 22.50 40.00   0.0 80.0   0.0 80.0
## CV residual       7.68 -9.12 -10.3  1.9 14.67 -4.66 -21.9 52.2 -18.2 44.3
##                    183
## Predicted        65.9
## cvpred           63.1
## Survey_occupancy 80.0
## CV residual      16.9
##
## Sum of squares = 9182    Mean square = 437    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 386


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879  209.80 <2e-16 ***
## Course_Level    5   2509     502    1.41   0.22
## Residuals     209  74593     357
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6    24    25   28   34    35    56   67    72
## Predicted           9.41  10.4 26.93 19.58 20.5 27.8 17.89  12.8 16.1  8.72
## cvpred             10.08  10.1 27.45 20.16 20.2 27.5 18.48  13.4 15.7  8.37
## Survey_occupancy    0.00   0.0 22.50 22.50 45.0 22.5 22.50   0.0 45.0 22.50
## CV residual       -10.08 -10.1 -4.95  2.34 24.8 -5.0  4.02 -13.4 29.3 14.13
##                       80    89   90    94  105   108   112   138  149   165
## Predicted           15.1  9.85 27.8 23.87 23.4 19.91  18.3  10.9 25.2  51.8
## cvpred              15.7  9.49 27.1 23.58 22.9 19.66  17.9  10.7 25.8  52.1
## Survey_occupancy     0.0  0.00 45.0 22.50 45.0 22.50   0.0   0.0 40.0  40.0
## CV residual        -15.7 -9.49 17.9 -1.08 22.1  2.84 -17.9 -10.7 14.2 -12.1
##                       211
## Predicted            4.77
## cvpred               4.45
## Survey_occupancy     0.00
## CV residual         -4.45
##
## Sum of squares = 4084    Mean square = 194    n = 21
##
## fold 2
## Observations in test set: 22
##                       12   21    22    30   42    49    76   81     96   117
## Predicted          28.6 25.0 20.71 25.80 18.9 27.49  32.3 26.7 44.737  17.2
## cvpred             29.1 25.2 21.12 26.22 19.7 27.93  34.6 28.9 44.666  18.0
## Survey_occupancy 45.0 22.5 22.50 22.50 22.5 22.50  22.5 45.0 45.000   0.0
## CV residual        15.9 -2.7  1.38 -3.72  2.8 -5.43 -12.1 16.1  0.334 -18.0
##                      121   123   125   135    136   140   148   171   189
## Predicted          44.4 22.85 17.09  33.1   9.29 17.32  19.5  28.6  38.5
```

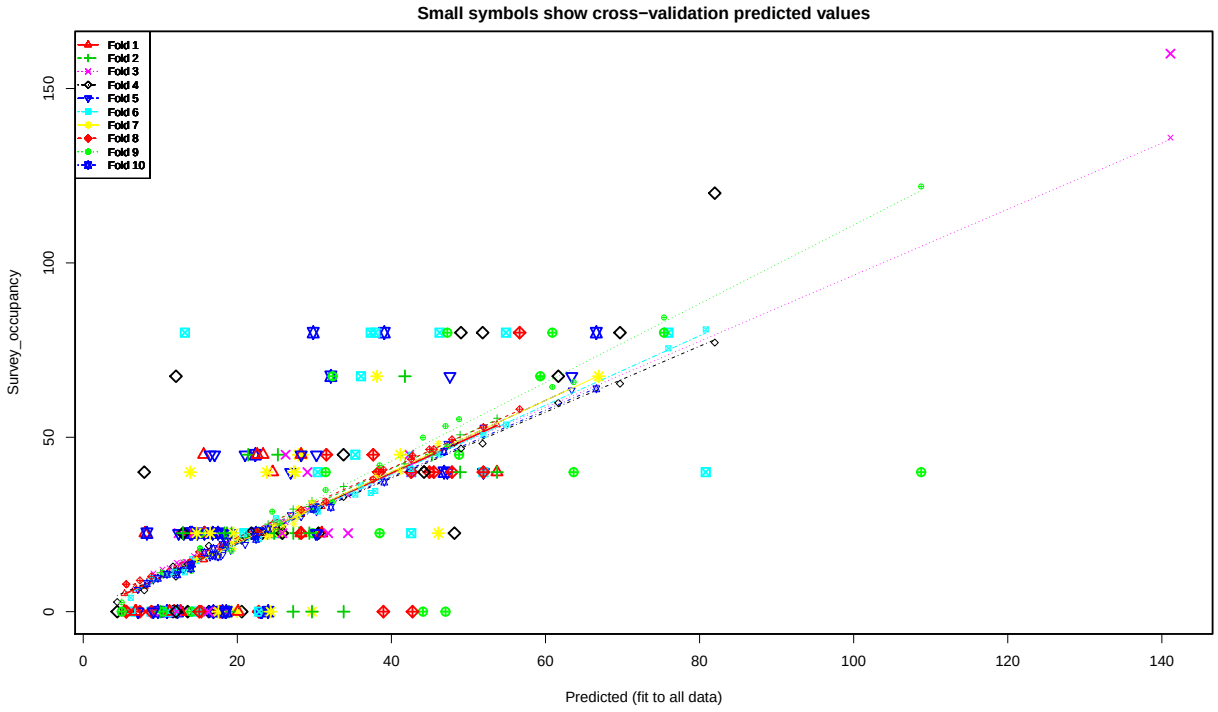
```
## cvpred           44.9 23.67 17.26  33.6  10.06 17.71  20.3  29.1  40.8
## Survey_occupancy 67.5 22.50 22.50  22.5   0.00 22.50   0.0   0.0   0.0
## CV residual      22.6 -1.17  5.24 -11.1 -10.06  4.79 -20.3 -29.1 -40.8
##                    190   199   205
## Predicted         49.9  53.8  29.8
## cvpred            50.2  56.1  30.2
## Survey_occupancy  40.0  40.0   0.0
## CV residual      -10.2 -16.1 -30.2
##
## Sum of squares = 6025    Mean square = 274    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2      8    13   19   20    40   48    54    55
## Predicted         14.4 16.19   9.85  11.5 28.1 15.6 18.45 29.2 18.45  39.4
## cvpred            15.8 16.73  11.54  13.1 27.8 16.2 18.84 28.9 18.84  38.4
## Survey_occupancy   0.0 22.50   0.00   0.0 45.0 22.5 22.50 22.5 22.50  22.5
## CV residual      -15.8  5.77 -11.54 -13.1 17.2  6.3  3.66 -6.4  3.66 -15.9
##                     73    79    83    87    95   100   131   147  167
## Predicted         7.59  6.92 12.00  15.5 42.18 26.80 29.75 137.7 22.8
## cvpred            9.42  7.81 12.58  16.8 41.07 27.41 29.42 130.5 23.7
## Survey_occupancy  0.00  0.00 22.50   0.0 45.00 22.50 22.50 160.0 40.0
## CV residual      -9.42 -7.81  9.92 -16.8  3.93 -4.91 -6.92  29.5 16.3
##                    174   182    191
## Predicted        44.18  13.2   9.29
## cvpred           44.23  14.7  11.01
## Survey_occupancy 40.00   0.0   0.00
## CV residual      -4.23 -14.7 -11.01
##
## Sum of squares = 3353    Mean square = 152    n = 22
##
## fold 4
## Observations in test set: 22
##                       3   11    17    18    27    45    57    69    82
## Predicted         18.9 13.1  33.7  12.1  18.5  16.8 38.79 23.87  9.29
## cvpred            17.6 11.3  33.5  11.5  19.8  18.3 38.09 20.97  8.92
## Survey_occupancy   0.0 22.5  22.5   0.0   0.0   0.0 45.00 22.50 67.50
## CV residual      -17.6 11.2 -11.0 -11.5 -19.8 -18.3  6.91  1.53 58.58
##                     103   107   110    127  134   145  154  195  203   204
## Predicted        17.65  47.6 63.65 24.543 12.6  80.6 68.5 45.3 48.7 49.26
## cvpred           15.38  49.5 60.43 22.632 10.8  75.7 68.3 40.3 43.3 49.61
## Survey_occupancy 22.50  22.5 67.50 22.500 22.5 120.0 80.0 80.0 80.0 40.00
## CV residual       7.12 -27.0  7.07 -0.132 11.7  44.3 11.7 39.7 36.7 -9.61
##                     206   208   210
## Predicted         5.90  9.85  10.8
## cvpred            5.88  9.43  15.1
## Survey_occupancy 40.00  0.00   0.0
## CV residual      34.12 -9.43 -15.1
##
## Sum of squares = 12462    Mean square = 566    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33     47   53    60    70    75    86   91    92
```

```
## Predicted        16.2 27.26 22.971 25.8 35.40 24.67  25.2  35.1 47.0  18.8
## cvpred           16.4 27.85 23.148 26.0 35.53 24.84  25.4  36.9 45.5  19.4
## Survey_occupancy 22.5 22.50 22.500 45.0 45.00 22.50   0.0  22.5 67.5   0.0
## CV residual       6.1 -5.35 -0.648 19.0  9.47 -2.34 -25.4 -14.4 22.0 -19.4
##                     98   106    114  118  139   141  142  158   168   176
## Predicted        10.42 62.52 -0.898 26.2 16.1  6.46 15.5 22.3  53.2  48.7
## cvpred            8.64 62.53 -8.629 24.4 14.3  4.70 13.7 20.5  54.9  50.4
## Survey_occupancy 22.50 67.50 22.500 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual      13.86  4.97 31.129 20.6 30.7 -4.70 31.3 19.5 -14.9 -10.4
##                    202   213
## Predicted         21.3  7.03
## cvpred            21.5  5.26
## Survey_occupancy   0.0  0.00
## CV residual      -21.5 -5.26
##
## Sum of squares = 6996    Mean square = 318    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85   126   128   137
## Predicted        17.89  12.8 26.36  47.3 25.56 40.8 38.23  11.4  10.4
## cvpred           16.83  11.6 25.56  47.1 26.44 36.4 37.78  11.9  10.5
## Survey_occupancy 22.50   0.0 22.50  22.5 22.50 67.5 45.00   0.0   0.0
## CV residual       5.67 -11.6 -3.06 -24.6 -3.94 31.1  7.22 -11.9 -10.5
##                    143   151  156  157   159    169   170   172  173  184
## Predicted         14.3  23.5 30.6 45.9  79.2 44.178  50.1 73.26 56.0 42.5
## cvpred            14.8  22.7 29.4 45.1  79.5 39.844  50.0 73.86 52.1 38.1
## Survey_occupancy   0.0   0.0 40.0 80.0  40.0 40.000  40.0 80.00 80.0 80.0
## CV residual      -14.8 -22.7 10.6 34.9 -39.5  0.156 -10.0  6.14 27.9 41.9
##                    197   200  207
## Predicted        38.8  9.41 16.2
## cvpred           38.4  8.10 15.1
## Survey_occupancy 80.0  0.00 80.0
## CV residual      41.6 -8.10 64.9
##
## Sum of squares = 14374    Mean square = 653    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99   101
## Predicted         23.5 25.0  18.9 27.9  34.8  45.9 33.4 21.15 15.39 65.91
## cvpred            23.5 24.9  18.3 27.4  34.9  46.0 32.8 20.58 15.25 66.19
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -23.5 20.1 -18.3 17.6 -34.9 -23.5 12.2  1.92  7.25  1.31
##                    104   111    120  130   132   144  146   153  166  175
## Predicted        41.05 10.40 22.737 41.6 15.50 13.81 28.1  13.2 26.4 17.8
## cvpred           41.14  6.36 22.652 41.7 14.88 13.17 28.0  12.6 26.3 17.2
## Survey_occupancy 45.00 22.50 22.500 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual       3.86 16.14 -0.152 25.8  7.62  9.33 12.0 -12.6 13.7 22.8
##                    185   214
## Predicted         11.0  21.7
## cvpred            10.3  21.1
## Survey_occupancy  40.0   0.0
## CV residual       29.7 -21.1
```

```
##
## Sum of squares = 6996    Mean square = 318    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51   63    74   102   109   122    129
## Predicted         14.3  22.7 35.97 14.4  5.22 37.39  3.62 31.45   8.61
## cvpred            15.8  24.2 36.05 14.5  6.83 38.72  4.94 31.58  10.18
## Survey_occupancy   0.0   0.0 45.00 22.5  0.00 45.00  0.00 22.50   0.00
## CV residual      -15.8 -24.2  8.95  8.0 -6.83  6.28 -4.94 -9.08 -10.18
##                     162   164   178   179   186  188  192   196   201   209
## Predicted         42.5  47.0  53.2 44.18  49.3 57.2 49.0  12.1  3.64  3.64
## cvpred            43.7  51.3  57.4 48.46  53.5 58.3 48.9  12.3  3.88  3.88
## Survey_occupancy   0.0  40.0  40.0 40.00  40.0 80.0 40.0   0.0  0.00  0.00
## CV residual      -43.7 -11.3 -17.4 -8.46 -13.5 21.7 -8.9 -12.3 -3.88 -3.88
##                     212   215
## Predicted        35.28  44.2
## cvpred           35.17  48.5
## Survey_occupancy 40.00   0.0
## CV residual       4.83 -48.5
##
## Sum of squares = 6973    Mean square = 332    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71    84   97   115
## Predicted         26.69 21.28 24.43 15.39  20.1  43.3 22.28 27.8 61.39
## cvpred            27.57 20.33 25.03 14.85  19.1  45.1 23.57 28.8 65.51
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.50
## CV residual      -5.07  2.17 -2.53  7.65 -19.1 -22.6 -1.07 38.7  1.99
##                     116   119   124  152   160  163   177   187 193   194
## Predicted         31.9  41.9 46.47 60.3  9.85 48.7  61.4  7.59 107 33.14
## cvpred            46.0  44.8 49.84 64.2  9.57 48.2  65.5  7.02 120 33.69
## Survey_occupancy   0.0   0.0 45.00 80.0  0.00 80.0  40.0  0.00  40 40.00
## CV residual      -46.0 -44.8 -4.84 15.8 -9.57 31.8 -25.5 -7.02 -80  6.31
##                     198   216
## Predicted        75.25  3.07
## cvpred           83.69  1.93
## Survey_occupancy 80.00  0.00
## CV residual      -3.69 -1.93
##
## Sum of squares = 15115    Mean square = 720    n = 21
##
## fold 10
## Observations in test set: 21
##                       10    14    23    31    36    39    44   46    50    59
## Predicted         25.8 13.13  14.9 17.89  19.0 17.65  12.6 36.5 19.02 17.20
## cvpred            25.1 12.63  15.8 16.92  18.1 17.28  12.0 36.1 18.08 18.15
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual      19.9  9.87 -15.8  5.58 -18.1  5.22 -12.0 31.4  4.42  4.35
##                     65    78    88   113   133   150   155 161   180  181
## Predicted        19.58  7.03  8.61 20.59  8.05 46.70  19.5  30  12.7 43.6
## cvpred           18.66  7.69  7.98 21.64  7.40 46.56  20.5  24  13.5 42.0
## Survey_occupancy 22.50  0.00  0.00 22.50 22.50 40.00   0.0  80   0.0 80.0
```

```
## CV residual       3.84 -7.69 -7.98  0.86 15.10 -6.56 -20.5  56 -13.5 38.0
##                    183
## Predicted         66.8
## cvpred            61.8
## Survey_occupancy  80.0
## CV residual       18.2
##
## Sum of squares = 8222    Mean square = 392    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 392

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                 Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs    1  74879   74879  205.62 <2e-16 ***
## Room             1    228     228    0.63   0.43
## Factor_Time      3    402     134    0.37   0.78
## Residuals      210  76473     364
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      4     6    24    25   28    34    35    56   67    72
## Predicted         5.35  11.8 25.10 17.49 23.3 30.95 15.73  6.85 15.6  8.02
## cvpred            5.16  11.6 24.29 16.73 22.5 30.11 14.99  6.11 14.8  7.27
```

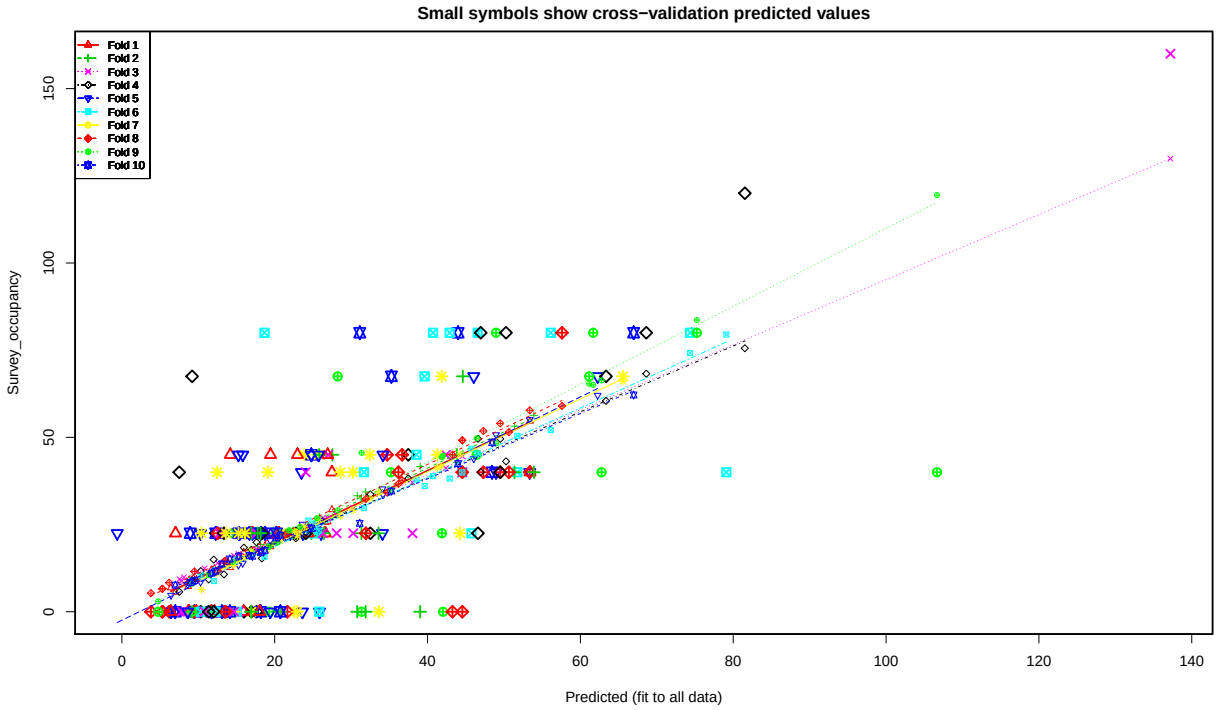
```
## Survey_occupancy  0.00   0.0 22.50 22.50 45.0 22.50 22.50  0.00 45.0 22.50
## CV residual      -5.16 -11.6 -1.79  5.77 22.5 -7.61  7.51 -6.11 30.2 15.23
##                    80    89   90    94  105   108   112   138  149   165
## Predicted         12.6  12.6 22.6 28.27 28.3 24.17  20.1  11.2 24.6  53.7
## cvpred            12.8  12.8 22.7 27.88 27.9 23.81  20.5  10.9 25.1  53.6
## Survey_occupancy   0.0   0.0 45.0 22.50 45.0 22.50   0.0   0.0 40.0  40.0
## CV residual      -12.8 -12.8 22.3 -5.38 17.1 -1.31 -20.5 -10.9 14.9 -13.6
##                   211
## Predicted         6.76
## cvpred            6.89
## Survey_occupancy  0.00
## CV residual      -6.89
##
## Sum of squares = 4137    Mean square = 197    n = 21
##
## fold 2
## Observations in test set: 22
##                     12    21    22     30   42     49    76   81     96
## Predicted        25.3 28.03 18.66 23.928 19.3 22.773 27.27 21.4 45.254
## cvpred           23.7 27.42 18.21 23.387 18.9 22.356 26.96 21.2 45.693
## Survey_occupancy 45.0 22.50 22.50 22.500 22.5 22.500 22.50 45.0 45.000
## CV residual      21.3 -4.92  4.29 -0.887  3.6  0.144 -4.46 23.8 -0.693
##                    117  121   123   125   135   136   140   148   171
## Predicted         18.9 41.8 24.78 18.33 29.35  10.0 12.95  24.0  29.7
## cvpred            19.9 42.4 25.67 19.33 30.13  11.1 14.01  25.1  31.7
## Survey_occupancy   0.0 67.5 22.50 22.50 22.50   0.0 22.50   0.0   0.0
## CV residual      -19.9 25.1 -3.17  3.17 -7.63 -11.1  8.49 -25.1 -31.7
##                    189   190   199   205
## Predicted         33.8  53.7  48.9  27.3
## cvpred            35.9  55.5  50.7  29.4
## Survey_occupancy   0.0  40.0  40.0   0.0
## CV residual      -35.9 -15.5 -10.7 -29.4
##
## Sum of squares = 6544    Mean square = 297    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     8    13   19   20    40    48    54    55
## Predicted         15.9 12.38  11.2  13.0 26.3 13.4 13.40 24.53 13.40  34.4
## cvpred            16.9 13.57  12.5  14.1 25.7 13.5 14.27 24.76 14.27  33.4
## Survey_occupancy   0.0 22.50   0.0   0.0 45.0 22.5 22.50 22.50 22.50  22.5
## CV residual      -16.9  8.93 -12.5 -14.1 19.3  9.0  8.23 -2.26  8.23 -10.9
##                     73     79    83    87    95   100   131   147  167
## Predicted         10.3   9.11 14.38  18.5 42.33 31.79 25.83 141.1 29.1
## cvpred            12.1  10.96 15.93  19.8 41.26 31.32 25.79 135.9 29.3
## Survey_occupancy   0.0   0.00 22.50   0.0 45.00 22.50 22.50 160.0 40.0
## CV residual      -12.1 -10.96  6.57 -19.8  3.74 -8.82 -3.29  24.1 10.7
##                    174   182   191
## Predicted        42.57  16.2  12.1
## cvpred           41.97  17.9  14.0
## Survey_occupancy 40.00   0.0   0.0
## CV residual      -1.97 -17.9 -14.0
##
## Sum of squares = 3453    Mean square = 157    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3    11    17    18    27    45   57     69   82
## Predicted         20.6 14.14 30.54  13.6  16.3  11.6 33.8 23.246 12.0
## cvpred            20.3 14.15 29.85  13.6  18.9  12.9 32.9 22.778 11.1
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.0 22.500 67.5
## CV residual      -20.3  8.35 -7.35 -13.6 -18.9 -12.9 12.1 -0.278 56.4
##                     103   107   110   127  134   145  154  195  203    204
## Predicted        21.831  48.2 61.67 25.83 13.0  82.0 69.7 49.0 51.8 44.233
## cvpred           23.187  48.4 59.87 24.27 11.9  77.2 65.4 46.8 48.2 40.901
## Survey_occupancy 22.500  22.5 67.50 22.50 22.5 120.0 80.0 80.0 80.0 40.000
## CV residual      -0.687 -25.9  7.63 -1.77 10.6  42.8 14.6 33.2 31.8 -0.901
##                     206 208   210
## Predicted         7.93  12  4.41
## cvpred            6.12  10  2.75
## Survey_occupancy 40.00   0  0.00
## CV residual      33.88 -10 -2.75
##
## Sum of squares = 10838    Mean square = 493    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33    47   53   60   70    75    86   91    92
## Predicted        12.4 30.37 18.09 21.0 30.3 19.1  23.2 30.20 47.6  23.0
## cvpred           11.9 30.08 16.37 19.3 28.6 17.6  23.4 30.32 47.9  23.5
## Survey_occupancy 22.5 22.50 22.50 45.0 45.0 22.5   0.0 22.50 67.5   0.0
## CV residual      10.6 -7.58  6.13 25.7 16.4  4.9 -23.4 -7.82 19.6 -23.5
##                      98   106  114  118  139   141  142  158   168   176
## Predicted        14.80 63.41 13.1 28.3 17.0  7.09 16.5 26.9  51.9 47.26
## cvpred           15.36 63.56 12.1 27.2 16.2  6.36 15.7 27.8  52.9 48.26
## Survey_occupancy 22.50 67.50 22.5 45.0 45.0  0.00 45.0 40.0  40.0 40.00
## CV residual       7.14  3.94 10.4 17.8 28.8 -6.36 29.3 12.2 -12.9 -8.26
##                     202   213
## Predicted         18.5  9.10
## cvpred            18.4  9.06
## Survey_occupancy   0.0  0.00
## CV residual      -18.4 -9.06
##
## Sum of squares = 5727    Mean square = 260    n = 22
##
## fold 6
## Observations in test set: 22
##                       5     9    61    62    64   85  126   128   137   143
## Predicted        14.14  8.87 20.90  42.6 25.00 36.1 35.3  11.8  11.2  14.7
## cvpred           15.07  9.60 22.53  45.0 26.78 36.2 33.6  11.4  10.8  14.5
## Survey_occupancy 22.50  0.00 22.50  22.5 22.50 67.5 45.0   0.0   0.0   0.0
## CV residual       7.43 -9.60 -0.03 -22.5 -4.28 31.3 11.4 -11.4 -10.8 -14.5
##                     151  156  157   159    169   170  172  173  184  197
## Predicted         22.8 30.4 46.3  80.8 42.572  51.9 76.0 54.9 37.9 37.3
## cvpred            20.8 28.7 45.1  80.9 40.893  50.6 75.5 53.6 34.6 34.0
## Survey_occupancy   0.0 40.0 80.0  40.0 40.000  40.0 80.0 80.0 80.0 80.0
## CV residual      -20.8 11.3 34.9 -40.9 -0.893 -10.6  4.5 26.4 45.4 46.0
##                     200  207
```

```
## Predicted         6.17 13.2
## cvpred            3.98 11.3
## Survey_occupancy  0.00 80.0
## CV residual      -3.98 68.7
##
## Sum of squares = 15438    Mean square = 702    n = 22
##
## fold 7
## Observations in test set: 22
##                      15   29    37   58    66    68   77    93    99    101
## Predicted         20.0 28.0  19.3 27.9  29.7  46.1 28.4 25.93 19.49 66.921
## cvpred            20.9 27.7  19.8 29.5  31.3  48.1 28.6 24.62 18.01 66.741
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.500
## CV residual      -20.9 17.3 -19.8 15.5 -31.3 -25.6 16.4 -2.12  4.49  0.759
##                     104   111   120  130   132   144  146   153  166  175
## Predicted        41.16 24.78 24.19 38.1 16.46 14.71 27.5  17.6 27.3 23.8
## cvpred           40.27 24.52 23.92 39.1 16.79 14.99 26.8  16.5 25.2 21.5
## Survey_occupancy 45.00 22.50 22.50 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual       4.73 -2.02 -1.42 28.4  5.71  7.51 13.2 -16.5 14.8 18.5
##                    185   214
## Predicted        13.9  24.3
## cvpred           12.4  23.9
## Survey_occupancy 40.0   0.0
## CV residual      27.6 -23.9
##
## Sum of squares = 6568    Mean square = 299    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38   51   63    74   102   109   122    129
## Predicted         15.3  22.8 31.6 13.9  7.36 37.64  17.7 28.29   8.85
## cvpred            15.8  22.8 31.4 14.1  8.95 37.88  18.8 29.18  10.12
## Survey_occupancy   0.0   0.0 45.0 22.5  0.00 45.00   0.0 22.50   0.00
## CV residual      -15.8 -22.8 13.6  8.4 -8.95  7.12 -18.8 -6.68 -10.12
##                     162   164   178  179   186  188   192   196   201   209
## Predicted         42.7 45.50  51.9 42.6 44.93 56.6 47.86  15.1  5.58  5.58
## cvpred            44.7 46.58  52.9 43.7 46.52 58.0 49.41  17.1  7.87  7.87
## Survey_occupancy   0.0 40.00  40.0 40.0 40.00 80.0 40.00   0.0  0.00  0.00
## CV residual      -44.7 -6.58 -12.9 -3.7 -6.52 22.0 -9.41 -17.1 -7.87 -7.87
##                     212   215
## Predicted        38.377  39.0
## cvpred           40.137  40.7
## Survey_occupancy 40.000   0.0
## CV residual      -0.137 -40.7
##
## Sum of squares = 6568    Mean square = 313    n = 21
##
## fold 9
## Observations in test set: 21
##                      26    32    41    43    52    71    84   97    115
## Predicted        29.78 19.24 24.53 15.16  15.2  38.5 25.51 32.4 59.325
## cvpred           29.28 17.41 28.67 18.12  18.1  41.9 25.38 31.4 67.057
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.50 67.5 67.500
## CV residual      -6.78  5.09 -6.17  4.38 -18.1 -19.4 -2.88 36.1  0.443
```

```
##                     116   119   124  152   160  163   177   187   193   194
## Predicted          47.0  44.1  48.8 60.9  14.0 47.3  63.7  10.4 108.8 31.46
## cvpred             53.2  49.9  55.2 64.4  11.7 47.4  65.8  11.1 121.9 34.88
## Survey_occupancy    0.0   0.0  45.0 80.0   0.0 80.0  40.0   0.0  40.0 40.00
## CV residual       -53.2 -49.9 -10.2 15.6 -11.7 32.6 -25.8 -11.1 -81.9  5.12
##                     198   216
## Predicted         75.38  5.00
## cvpred            84.34  2.65
## Survey_occupancy 80.00  0.00
## CV residual       -4.34 -2.65
##
## Sum of squares = 16573    Mean square = 789    n = 21
##
## fold 10
## Observations in test set: 21
##                      10    14    23    31    36   39    44   46   50   59
## Predicted         22.3 14.14  18.1 15.73  16.9 17.5  12.2 32.1 14.0 16.8
## cvpred            21.6 13.62  19.2 16.96  18.1 15.7  10.6 29.9 12.3 16.1
## Survey_occupancy 45.0 22.50   0.0 22.50   0.0 22.5   0.0 67.5 22.5 22.5
## CV residual       23.4  8.88 -19.2  5.54 -18.1  6.8 -10.6 37.6 10.2  6.4
##                      65    78    88   113   133   150   155  161   180  181
## Predicted         13.88  9.70  10.9 22.43  8.27 46.84  24.0 29.9  18.6 39.1
## cvpred            13.26  9.56  10.7 20.74  8.06 45.89  23.7 29.4  20.2 37.2
## Survey_occupancy 22.50  0.00   0.0 22.50 22.50 40.00   0.0 80.0   0.0 80.0
## CV residual        9.24 -9.56 -10.7  1.76 14.44 -5.89 -23.7 50.6 -20.2 42.8
##                     183
## Predicted          66.6
## cvpred             63.9
## Survey_occupancy 80.0
## CV residual        16.1
##
## Sum of squares = 9235    Mean square = 440    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 394


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879  209.55 <2e-16 ***
## Room            1    228     228    0.64   0.43
## Course_Level    5   2550     510    1.43   0.22
## Residuals     208  74324     357
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      4     6    24    25   28    34    35    56   67    72
## Predicted         8.81  8.68 25.90 18.73 19.5 26.62 17.08  12.1 14.2  7.02
## cvpred            9.13  7.23 25.87 18.85 18.6 25.65 17.23  12.4 12.6  5.61
## Survey_occupancy  0.00  0.00 22.50 22.50 45.0 22.50 22.50   0.0 45.0 22.50
## CV residual      -9.13 -7.23 -3.37  3.65 26.4 -3.15  5.27 -12.4 32.4 16.89
##                     80    89   90    94  105   108   112   138  149   165
## Predicted         15.9  9.75 26.9 24.39 23.0 20.53  18.0  11.7 27.5  53.4
## cvpred            17.0  9.19 25.7 24.37 22.2 20.59  17.3  11.9 29.3  54.6
## Survey_occupancy   0.0  0.00 45.0 22.50 45.0 22.50   0.0   0.0 40.0  40.0
## CV residual      -17.0 -9.19 19.3 -1.87 22.8  1.91 -17.3 -11.9 10.7 -14.6
##                    211
## Predicted         6.41
## cvpred            6.83
## Survey_occupancy  0.00
## CV residual      -6.83
##
## Sum of squares = 4472    Mean square = 213    n = 21
##
## fold 2
## Observations in test set: 22
##                      12     21    22    30    42    49    76   81    96
## Predicted         27.6 23.866 19.83 24.80 16.95 26.45  31.3 25.8 43.84
## cvpred            27.1 23.106 19.46 24.34 15.95 25.97  32.6 27.2 42.79
## Survey_occupancy 45.0 22.500 22.50 22.50 22.50 22.50  22.5 45.0 45.00
## CV residual      17.9 -0.606  3.04 -1.84  6.55 -3.47 -10.1 17.8  2.21
##                    117  121    123   125   135   136  140   148   171
## Predicted         16.9 44.6 22.432 17.77  33.6  9.20 18.1  20.7  30.8
```

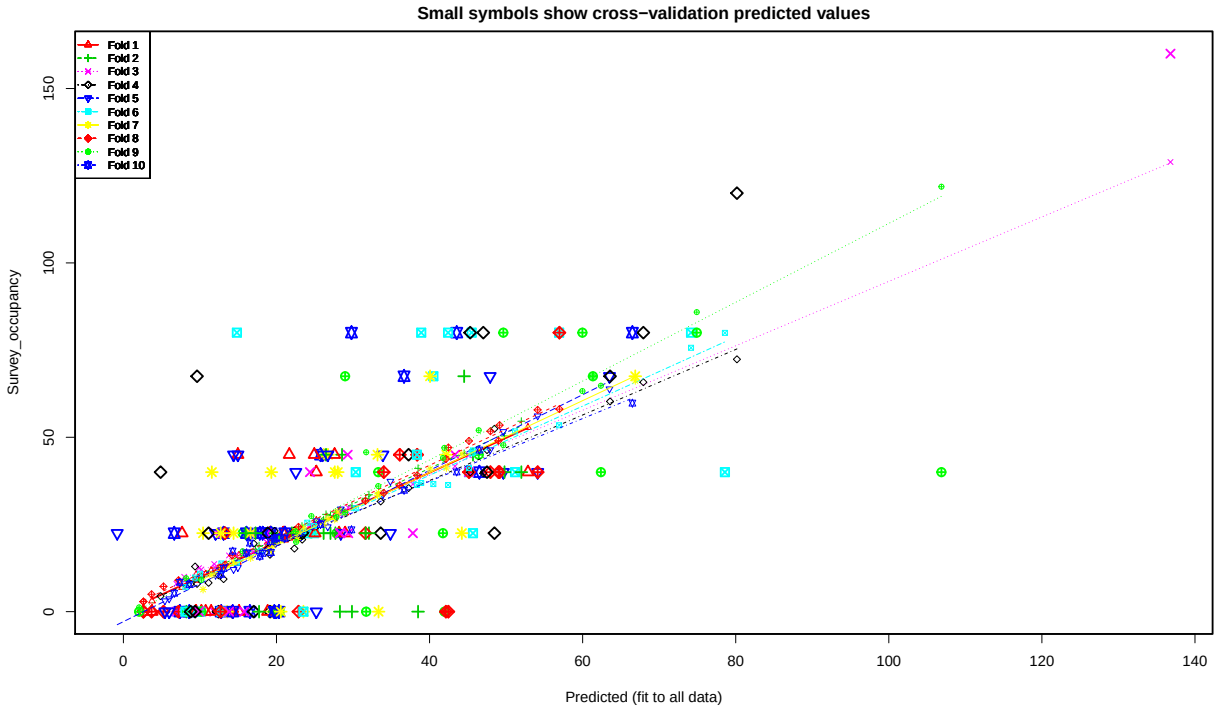
```
## cvpred            17.4 45.4 22.851 18.61  34.5  9.82 19.3  22.7  33.3
## Survey_occupancy   0.0 67.5 22.500 22.50  22.5  0.00 22.5   0.0   0.0
## CV residual      -17.4 22.1 -0.351  3.89 -12.0 -9.82  3.2 -22.7 -33.3
##                    189   190   199   205
## Predicted         39.0  51.4  53.9  31.9
## cvpred            41.7  53.2  56.3  34.3
## Survey_occupancy   0.0  40.0  40.0   0.0
## CV residual      -41.7 -13.2 -16.3 -34.3
##
## Sum of squares = 6852    Mean square = 311    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     8     13   19   20    40    48    54
## Predicted         12.5 15.42  8.13   9.78 27.0 14.9 17.63 28.10 17.63
## cvpred            14.0 15.92  9.87  11.42 26.8 15.4 17.98 27.78 17.98
## Survey_occupancy   0.0 22.50  0.00   0.00 45.0 22.5 22.50 22.50 22.50
## CV residual      -14.0  6.58 -9.87 -11.42 18.2  7.1  4.52 -5.28  4.52
##                     55    73    79    83    87    95   100   131   147
## Predicted         38.0  7.54  7.85 12.81  15.3 42.41 26.29 30.28 137.2
## cvpred            37.1  9.34  8.74 13.39  16.6 41.19 26.88 29.84 129.9
## Survey_occupancy  22.5  0.00  0.00 22.50   0.0 45.00 22.50 22.50 160.0
## CV residual      -14.6 -9.34 -8.74  9.11 -16.6  3.81 -4.38 -7.34  30.1
##                    167  174   182   191
## Predicted        24.1 44.6  14.7  10.8
## cvpred           24.8 44.6  16.0  12.4
## Survey_occupancy 40.0 40.0   0.0   0.0
## CV residual      15.2 -4.6 -16.0 -12.4
##
## Sum of squares = 3308    Mean square = 150    n = 22
##
## fold 4
## Observations in test set: 22
##                       3   11    17    18    27    45    57    69    82  103
## Predicted          16.9 12.3  32.5  10.3  17.6  16.0 37.48 22.76  9.20 18.3
## cvpred             17.8 11.4  33.7  11.7  19.9  18.4 38.24 21.08  8.94 15.3
## Survey_occupancy    0.0 22.5  22.5   0.0   0.0   0.0 45.00 22.50 67.50 22.5
## CV residual      -17.8 11.1 -11.2 -11.7 -19.9 -18.4  6.76  1.42 58.56  7.2
##                    107   110    127  134   145  154  195  203   204   206
## Predicted         46.6 63.36 24.086 13.4  81.5 68.6 47.0 50.3 49.51  7.51
## cvpred            49.6 60.46 22.683 10.7  75.6 68.3 40.1 43.1 49.57  5.70
## Survey_occupancy  22.5 67.50 22.500 22.5 120.0 80.0 80.0 80.0 40.00 40.00
## CV residual      -27.1  7.04 -0.183 11.8  44.4 11.7 39.9 36.9 -9.57 34.30
##                    208   210
## Predicted        11.37  12.0
## cvpred            9.27  14.9
## Survey_occupancy  0.00   0.0
## CV residual      -9.27 -14.9
##
## Sum of squares = 12530    Mean square = 570    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33     47   53   60     70    75    86   91
```

```
## Predicted        15.42 26.07 22.040 24.8 34.2 23.694  25.9  34.1 46.0
## cvpred           15.15 25.98 21.648 24.4 33.6 23.272  26.3  35.2 43.9
## Survey_occupancy 22.50 22.50 22.500 45.0 45.0 22.500   0.0  22.5 67.5
## CV residual       7.35 -3.48  0.852 20.6 11.4 -0.772 -26.3 -12.7 23.6
##                     92    98   106    114  118  139   141  142  158   168
## Predicted         19.4 10.30 62.26 -0.604 25.7 15.8  6.44 15.3 23.5  53.4
## cvpred            20.4  8.51 62.06 -8.014 23.7 13.9  4.72 13.4 22.4  55.1
## Survey_occupancy   0.0 22.50 67.50 22.500 45.0 45.0  0.00 45.0 40.0  40.0
## CV residual      -20.4 13.99  5.44 30.514 21.3 31.1 -4.72 31.6 17.6 -15.1
##                     176   202   213
## Predicted         49.0  23.6  8.62
## cvpred            50.8  25.1  7.79
## Survey_occupancy  40.0   0.0  0.00
## CV residual      -10.8 -25.1 -7.79
##
## Sum of squares = 7398    Mean square = 336    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85   126   128   137 143
## Predicted        17.08  12.1 25.35  45.7 24.42 39.6 38.55  12.3  10.3  15
## cvpred           16.67  11.5 25.35  46.7 26.16 36.1 37.89  12.1  10.4  15
## Survey_occupancy 22.50   0.0 22.50  22.5 22.50 67.5 45.00   0.0   0.0   0
## CV residual       5.83 -11.5 -2.85 -24.2 -3.66 31.4  7.11 -12.1 -10.4 -15
##                     151  156  157   159     169   170   172  173  184  197
## Predicted         25.8 31.7 46.6  79.1 44.5504  51.8 74.36 56.1 42.9 40.7
## cvpred            23.3 29.7 45.4  79.5 39.9301  50.4 74.15 52.1 38.2 38.9
## Survey_occupancy   0.0 40.0 80.0  40.0 40.0000  40.0 80.00 80.0 80.0 80.0
## CV residual      -23.3 10.3 34.6 -39.5  0.0699 -10.4  5.85 27.9 41.8 41.1
##                     200  207
## Predicted        12.05 18.7
## cvpred            8.79 15.7
## Survey_occupancy  0.00 80.0
## CV residual      -8.79 64.3
##
## Sum of squares = 14268    Mean square = 649    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77   93    99   101
## Predicted         22.6 23.9  16.9 25.8  33.6  44.3 32.5 20.8 16.12 65.57
## cvpred            23.1 24.4  17.4 26.4  34.3  45.2 32.4 20.4 15.57 66.02
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.5 22.50 67.50
## CV residual      -23.1 20.6 -17.4 18.6 -34.3 -22.7 12.6  2.1  6.93  1.48
##                     104   111    120  130   132   144  146   153  166  175
## Predicted        41.31 10.42 23.284 41.9 15.26 13.61 30.2  14.7 28.6 19.1
## cvpred           41.26  6.37 22.883 41.8 14.78 13.09 29.1  13.3 27.4 17.8
## Survey_occupancy 45.00 22.50 22.500 67.5 22.50 22.50 40.0   0.0 40.0 40.0
## CV residual       3.74 16.13 -0.383 25.7  7.72  9.41 10.9 -13.3 12.6 22.2
##                     185   214
## Predicted        12.5  23.0
## cvpred           11.0  21.7
## Survey_occupancy 40.0   0.0
## CV residual      29.0 -21.7
```

```
##
## Sum of squares = 6855    Mean square = 312    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38   51   63    74  102   109   122   129   162
## Predicted         13.4  21.7 34.7 12.5  6.19 36.7  3.81 31.93   9.5  43.3
## cvpred            14.4  22.5 34.2 11.8  8.32 37.7  5.32 32.35  11.5  45.0
## Survey_occupancy   0.0   0.0 45.0 22.5  0.00 45.0  0.00 22.50   0.0   0.0
## CV residual      -14.4 -22.5 10.8 10.7 -8.32  7.3 -5.32 -9.85 -11.5 -45.0
##                     164   178   179   186  188   192   196   201   209
## Predicted         47.3  53.4 44.55  49.5 57.6  50.6  13.6  5.31  5.31
## cvpred            51.8  57.8 49.15  54.0 59.0  51.5  14.6  6.56  6.56
## Survey_occupancy  40.0  40.0 40.00  40.0 80.0  40.0   0.0  0.00  0.00
## CV residual      -11.8 -17.8 -9.15 -14.0 21.0 -11.5 -14.6 -6.56 -6.56
##                     212   215
## Predicted        36.19  44.6
## cvpred           36.66  49.2
## Survey_occupancy 40.00   0.0
## CV residual       3.34 -49.2
##
## Sum of squares = 7391    Mean square = 352    n = 21
##
## fold 9
## Observations in test set: 21
##                       26    32    41    43    52    71     84   97   115
## Predicted        25.52 20.39 23.31 14.49  19.3  41.9 21.880 28.2 61.16
## cvpred           26.84 19.82 24.33 14.28  18.6  44.3 23.375 29.0 65.37
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.500 67.5 67.50
## CV residual      -4.34  2.68 -1.83  8.22 -18.6 -21.8 -0.875 38.5  2.13
##                     116   119   124  152   160  163   177   187   193   194
## Predicted         31.4  42.0 46.44 61.7  11.4 49.0  62.8  9.17 106.7 35.21
## cvpred            45.6  44.7 49.77 65.1  10.5 48.3  66.3  7.99 119.4 34.91
## Survey_occupancy   0.0   0.0 45.00 80.0   0.0 80.0  40.0  0.00  40.0 40.00
## CV residual      -45.6 -44.7 -4.77 14.9 -10.5 31.7 -26.3 -7.99 -79.4  5.09
##                     198   216
## Predicted        75.24  4.76
## cvpred           83.64  2.96
## Survey_occupancy 80.00  0.00
## CV residual      -3.64 -2.96
##
## Sum of squares = 14957    Mean square = 712    n = 21
##
## fold 10
## Observations in test set: 21
##                       10   14    23    31    36    39    44   46    50    59
## Predicted        24.8 12.3  13.1 17.08  18.2 16.70  11.7 35.3 18.18 15.29
## cvpred           23.8 11.6  13.7 15.91  17.0 16.15  11.1 34.6 17.05 15.95
## Survey_occupancy 45.0 22.5   0.0 22.50   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual      21.2 10.9 -13.7  6.59 -17.0  6.35 -11.1 32.9  5.45  6.55
##                      65    78    88  113   133  150   155  161   180  181
## Predicted        18.73  6.99  9.50 20.2  8.95 48.4  20.7 31.1  14.1 44.0
## cvpred           17.61  7.62  8.95 21.2  8.39 48.5  21.9 25.3  15.1 42.5
## Survey_occupancy 22.50  0.00  0.00 22.5 22.50 40.0   0.0 80.0   0.0 80.0
```

```
## CV residual       4.89 -7.62 -8.95  1.3 14.11 -8.5 -21.9 54.7 -15.1 37.5
##                   183
## Predicted        67.0
## cvpred           62.1
## Survey_occupancy 80.0
## CV residual      17.9
##
## Sum of squares = 8264    Mean square = 394    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 400

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879  207.30 <2e-16 ***
## Factor_Time     3    374     125    0.35   0.79
## Course_Level    5   2321     464    1.28   0.27
## Residuals     206  74408     361
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      4     6    24   25   28    34    35    56   67    72
## Predicted          9.5  10.7 28.18 20.9 21.7 28.96 19.21  11.5 15.0  7.66
## cvpred            10.6  10.7 28.33 21.1 21.1 28.31 19.43  11.8 14.2  6.94
```

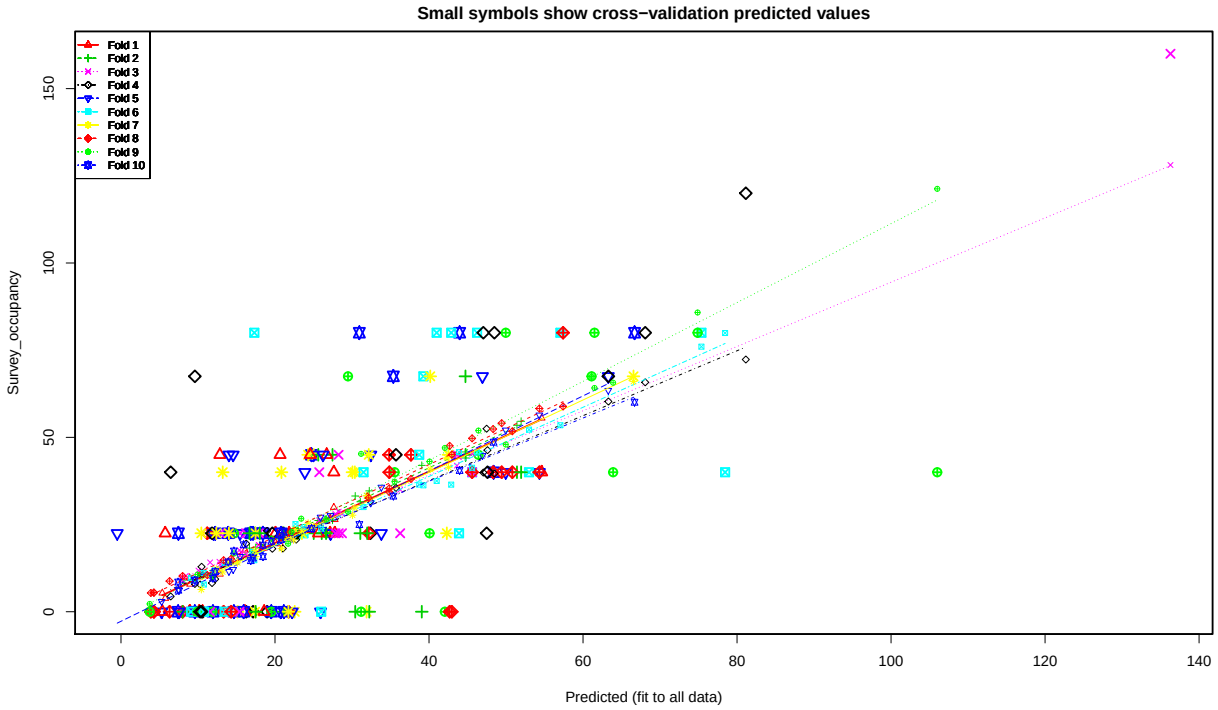
```
## Survey_occupancy   0.0   0.0 22.50 22.5 45.0 22.50 22.50   0.0 45.0 22.50
## CV residual      -10.6 -10.7 -5.83  1.4 23.9 -5.81  3.07 -11.8 30.8 15.56
##                    80    89   90    94  105   108   112   138  149   165
## Predicted         15.1  10.2 27.6 25.04 24.9 21.11  18.8  9.45 25.2  52.9
## cvpred            16.1  10.2 27.4 24.41 24.0 20.52  18.8  8.99 26.1  52.8
## Survey_occupancy   0.0   0.0 45.0 22.50 45.0 22.50   0.0  0.00 40.0  40.0
## CV residual      -16.1 -10.2 17.6 -1.91 21.0  1.98 -18.8 -8.99 13.9 -12.8
##                   211
## Predicted         3.74
## cvpred            3.05
## Survey_occupancy  0.00
## CV residual      -3.05
##
## Sum of squares = 4132    Mean square = 197    n = 21
##
## fold 2
## Observations in test set: 22
##                     12    21      22    30    42    49    76   81     96
## Predicted        28.6 26.16 22.0089 27.06 19.41 27.69  32.1 26.5 45.672
## cvpred           28.3 26.34 22.4683 27.52 20.61 28.53  33.5 27.9 45.953
## Survey_occupancy 45.0 22.50 22.5000 22.50 22.50 22.50  22.5 45.0 45.000
## CV residual      16.7 -3.84  0.0317 -5.02  1.89 -6.03 -11.0 17.1 -0.953
##                    117  121   123   125   135   136   140   148   171
## Predicted         17.7 44.5 23.33 17.26  31.7  8.22 15.95  19.7  29.9
## cvpred            18.9 45.4 24.54 17.81  32.5  9.42 16.78  19.8  30.3
## Survey_occupancy   0.0 67.5 22.50 22.50  22.5  0.00 22.50   0.0   0.0
## CV residual      -18.9 22.1 -2.04  4.69 -10.0 -9.42  5.72 -19.8 -30.3
##                    189   190   199   205
## Predicted         38.5  49.8  52.0  28.3
## cvpred            41.1  50.4  54.6  29.1
## Survey_occupancy   0.0  40.0  40.0   0.0
## CV residual      -41.1 -10.4 -14.6 -29.1
##
## Sum of squares = 6039    Mean square = 275    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     8    13   19   20    40    48    54    55
## Predicted         14.7 16.23  10.2  11.9 29.3 17.0 18.72 29.38 18.72  37.8
## cvpred            16.2 16.94  12.1  13.6 28.7 17.2 19.94 29.84 19.94  36.6
## Survey_occupancy   0.0 22.50   0.0   0.0 45.0 22.5 22.50 22.50 22.50  22.5
## CV residual      -16.2  5.56 -12.1 -13.6 16.3  5.3  2.56 -7.34  2.56 -14.1
##                     73    79    83    87    95   100   131   147  167
## Predicted          7.94  6.92 11.97  15.8 43.32 28.30 28.29 136.8 24.4
## cvpred            10.00  7.98 12.66  17.3 41.69 28.49 27.74 128.9 24.8
## Survey_occupancy   0.00  0.00 22.50   0.0 45.00 22.50 22.50 160.0 40.0
## CV residual      -10.00 -7.98  9.84 -17.3  3.31 -5.99 -5.24  31.1 15.2
##                    174   182    191
## Predicted        45.15  13.8   9.87
## cvpred           44.84  16.1  12.48
## Survey_occupancy 40.00   0.0   0.00
## CV residual      -4.84 -16.1 -12.48
##
## Sum of squares = 3455    Mean square = 157    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3    11   17    18    27    45    57    69    82
## Predicted         19.2 13.09 33.6  12.4  19.8  17.0 37.26 22.35  9.62
## cvpred            16.3  9.33 31.6  10.4  23.2  19.5 35.44 18.08  7.97
## Survey_occupancy   0.0 22.50 22.5   0.0   0.0   0.0 45.00 22.50 67.50
## CV residual      -16.3 13.17 -9.1 -10.4 -23.2 -19.5  9.56  4.42 59.53
##                     103   107   110   127   134   145  154  195  203   204
## Predicted         18.87  48.5 63.58 23.37 11.13  80.2 67.9 45.3 47.0 47.50
## cvpred            18.08  52.4 60.27 20.65  8.26  72.4 65.8 40.0 39.7 46.34
## Survey_occupancy 22.50  22.5 67.50 22.50 22.50 120.0 80.0 80.0 80.0 40.00
## CV residual       4.42 -29.9  7.23  1.85 14.24  47.6 14.2 40.0 40.3 -6.34
##                     206   208    210
## Predicted         4.86  8.78   9.37
## cvpred            4.44  7.88  12.94
## Survey_occupancy 40.00  0.00   0.00
## CV residual      35.56 -7.88 -12.94
##
## Sum of squares = 13610    Mean square = 619    n = 22
##
## fold 5
## Observations in test set: 22
##                       7    33     47   53   60     70    75    86   91  92
## Predicted         16.23 28.40 23.207 26.0 33.9 23.241  25.2  34.9 47.9  20
## cvpred            17.06 29.43 22.716 25.5 33.5 22.832  26.0  37.4 46.4  21
## Survey_occupancy 22.50 22.50 22.500 45.0 45.0 22.500   0.0  22.5 67.5   0
## CV residual       5.44 -6.93 -0.216 19.5 11.5 -0.332 -26.0 -14.9 21.1 -21
##                     98   106    114  118  139   141  142  158   168   176
## Predicted         12.0 63.51 -0.807 26.7 15.0  5.42 14.4 22.5  54.1  49.6
## cvpred            10.5 63.87 -8.590 24.3 12.7  3.11 12.1 21.5  56.1  51.6
## Survey_occupancy 22.5 67.50 22.500 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual       12.0  3.63 31.090 20.7 32.3 -3.11 32.9 18.5 -16.1 -11.6
##                     202   213
## Predicted         19.9  5.98
## cvpred            19.5  3.67
## Survey_occupancy   0.0  0.00
## CV residual      -19.5 -3.67
##
## Sum of squares = 7197    Mean square = 327    n = 22
##
## fold 6
## Observations in test set: 22
##                       5     9    61    62   64   85   126   128   137   143
## Predicted         17.91  12.9 24.92  45.7 24.0 40.5 38.35  10.0  9.35  12.8
## cvpred            17.29  12.0 24.58  46.2 25.5 36.6 36.32  10.9  9.77  13.8
## Survey_occupancy 22.50   0.0 22.50  22.5 22.5 67.5 45.00   0.0  0.00   0.0
## CV residual       5.21 -12.0 -2.08 -23.7 -3.0 30.9  8.68 -10.9 -9.77 -13.8
##                     151  156  157   159   169   170   172  173  184  197
## Predicted         23.5 30.4 45.5  78.6 45.15  51.2 74.16 56.9 42.4 38.9
## cvpred            23.1 29.7 45.4  79.9 41.17  51.7 75.66 53.4 36.3 36.9
## Survey_occupancy   0.0 40.0 80.0  40.0 40.00  40.0 80.00 80.0 80.0 80.0
## CV residual      -23.1 10.3 34.6 -39.9 -1.17 -11.7  4.34 26.6 43.7 43.1
##                     200  207
```

```
## Predicted         8.10 14.8
## cvpred            7.04 14.1
## Survey_occupancy  0.00 80.0
## CV residual      -7.04 65.9
##
## Sum of squares = 14641    Mean square = 665    n = 22
##
## fold 7
## Observations in test set: 22
##                      15   29    37   58    66    68   77    93    99   101
## Predicted         23.5 26.2  19.4 26.7  33.3  44.2 33.2 22.69 16.63 66.87
## cvpred            24.0 25.0  18.5 26.7  34.1  45.2 33.4 20.71 15.37 66.19
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -24.0 20.0 -18.5 18.3 -34.1 -22.7 11.6  1.79  7.13  1.31
##                     104   111    120  130   132  144  146   153  166  175
## Predicted        42.20 10.41 22.872 40.1 14.39 12.7 28.0  13.5 27.6 19.3
## cvpred           41.19  6.36 22.829 40.9 14.16 12.5 28.6  13.2 26.4 17.3
## Survey_occupancy 45.00 22.50 22.500 67.5 22.50 22.5 40.0   0.0 40.0 40.0
## CV residual       3.81 16.14 -0.329 26.6  8.34 10.0 11.4 -13.2 13.6 22.7
##                     185   214
## Predicted        11.6  20.6
## cvpred           10.6  20.4
## Survey_occupancy 40.0   0.0
## CV residual      29.4 -20.4
##
## Sum of squares = 6964    Mean square = 317    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38    51    63    74  102   109   122  129   162
## Predicted         14.2  22.9 36.10 13.27  5.24 38.4  3.68 31.62  7.2  42.1
## cvpred            16.1  24.3 36.21 13.44  7.22 39.1  4.99 31.76  9.0  43.8
## Survey_occupancy   0.0   0.0 45.00 22.50  0.00 45.0  0.00 22.50  0.0   0.0
## CV residual      -16.1 -24.3  8.79  9.06 -7.22  5.9 -4.99 -9.26 -9.0 -43.8
##                     164   178   179   186  188 192   196   201   209   212
## Predicted         48.0  54.1 45.15  49.2 57.0  49  12.7  2.62  2.62 34.02
## cvpred            51.7  57.9 48.96  53.5 58.1  49  12.6  2.87  2.87 34.03
## Survey_occupancy  40.0  40.0 40.00  40.0 80.0  40   0.0  0.00  0.00 40.00
## CV residual      -11.7 -17.9 -8.96 -13.5 21.9  -9 -12.6 -2.87 -2.87  5.97
##                     215
## Predicted         42.5
## cvpred            47.1
## Survey_occupancy   0.0
## CV residual      -47.1
##
## Sum of squares = 6911    Mean square = 329    n = 21
##
## fold 9
## Observations in test set: 21
##                      26    32    41    43    52    71     84   97     115
## Predicted        27.84 22.57 24.55 15.58  20.4  41.7 22.522 29.0 61.3402
## cvpred           27.15 19.98 27.41 17.31  21.5  44.0 22.958 28.4 67.5574
## Survey_occupancy 22.50 22.50 22.50 22.50   0.0  22.5 22.500 67.5 67.5000
## CV residual      -4.65  2.52 -4.91  5.19 -21.5 -21.5 -0.458 39.1 -0.0574
```

```
##                     116   119   124  152   160  163   177   187   193   194
## Predicted          31.7  41.9 46.43 60.0 10.18 49.6  62.4  8.19 106.9 33.30
## cvpred             45.7  47.0 52.01 63.3  9.08 47.7  64.8  9.59 121.9 36.01
## Survey_occupancy    0.0   0.0 45.00 80.0  0.00 80.0  40.0  0.00  40.0 40.00
## CV residual       -45.7 -47.0 -7.01 16.7 -9.08 32.3 -24.8 -9.59 -81.9  3.99
##                     198   216
## Predicted         74.91  2.06
## cvpred            85.89  1.23
## Survey_occupancy 80.00  0.00
## CV residual       -5.89 -1.23
##
## Sum of squares = 15738    Mean square = 749    n = 21
##
## fold 10
## Observations in test set: 21
##                      10   14    23    31    36    39    44   46    50    59
## Predicted         25.8 13.1  16.5 19.21  20.3 17.83  12.8 36.7 19.28 16.08
## cvpred            25.0 12.4  19.7 20.11  21.3 15.89  10.7 34.8 16.95 16.83
## Survey_occupancy 45.0 22.5   0.0 22.50   0.0 22.50   0.0 67.5 22.50 22.50
## CV residual       20.0 10.1 -19.7  2.39 -21.3  6.61 -10.7 32.7  5.55  5.67
##                      65    78   88  113   133   150   155  161   180  181
## Predicted         18.19  7.38  8.6 21.1  6.64 46.51  19.7 29.8  14.3 43.5
## cvpred            16.72  8.40  7.8 21.1  5.28 46.34  21.1 23.5  17.3 40.1
## Survey_occupancy 22.50  0.00  0.0 22.5 22.50 40.00   0.0 80.0   0.0 80.0
## CV residual       5.78 -8.40 -7.8  1.4 17.22 -6.34 -21.1 56.5 -17.3 39.9
##                    183
## Predicted         66.5
## cvpred            59.8
## Survey_occupancy 80.0
## CV residual       20.2
##
## Sum of squares = 9084    Mean square = 433    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 406


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  74879   74879  207.14 <2e-16 ***
## Room            1    228     228    0.63   0.43
## Factor_Time     3    402     134    0.37   0.77
## Course_Level    5   2366     473    1.31   0.26
## Residuals     205  74107     361
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        4     6    24    25   28    34    35    56   67    72
## Predicted           8.91  8.97 27.16 20.06 20.7 27.76 18.43  10.6 12.8  5.74
## cvpred              9.69  7.90 26.74 19.79 19.5 26.42 18.19  10.4 10.8  3.83
## Survey_occupancy    0.00  0.00 22.50 22.50 45.0 22.50 22.50   0.0 45.0 22.50
## CV residual        -9.69 -7.90 -4.24  2.71 25.5 -3.92  4.31 -10.4 34.2 18.67
##                       80    89   90    94  105    108   112   138  149   165
## Predicted           16.1  10.1 26.7 25.66 24.6 21.838  18.6  10.2 27.6  54.6
## cvpred              17.7  10.0 26.0 25.31 23.3 21.569  18.3  10.1 29.9  55.5
## Survey_occupancy     0.0   0.0 45.0 22.50 45.0 22.500   0.0   0.0 40.0  40.0
## CV residual        -17.7 -10.0 19.0 -2.81 21.7  0.931 -18.3 -10.1 10.1 -15.5
##                       211
## Predicted           5.36
## cvpred              5.35
## Survey_occupancy    0.00
## CV residual        -5.35
##
## Sum of squares = 4557    Mean square = 217    n = 21
##
## fold 2
## Observations in test set: 22
##                         12    21    22    30    42    49    76   81     96
## Predicted            27.5 25.03 21.16 26.07 17.41 26.63 31.08 25.6 44.754
## cvpred               26.3 24.29 20.86 25.69 16.87 26.59 31.53 26.2 44.087
## Survey_occupancy     45.0 22.50 22.50 22.50 22.50 22.50 22.50 45.0 45.000
## CV residual          18.7 -1.79  1.64 -3.19  5.63 -4.09 -9.03 18.8  0.913
##                        117  121   123   125   135   136   140   148   171
## Predicted            17.5 44.7 22.95 18.03  32.0  8.01 16.69  21.1  32.2
```

```
## cvpred            18.4 45.8 23.77 19.22  33.3  9.06 18.24  22.3  34.7
## Survey_occupancy   0.0 67.5 22.50 22.50  22.5  0.00 22.50   0.0   0.0
## CV residual      -18.4 21.7 -1.27  3.28 -10.8 -9.06  4.26 -22.3 -34.7
##                    189   190   199   205
## Predicted         39.1  51.4  52.0  30.4
## cvpred            42.0  53.5  54.6  33.2
## Survey_occupancy   0.0  40.0  40.0   0.0
## CV residual      -42.0 -13.5 -14.6 -33.2
##
## Sum of squares = 6845    Mean square = 311    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2      8    13   19    20    40    48    54
## Predicted         12.8 15.46   8.42  10.1 28.3 16.24 17.90 28.27 17.90
## cvpred            14.3 16.04  10.28  11.8 27.6 16.46 19.11 28.72 19.11
## Survey_occupancy   0.0 22.50   0.00   0.0 45.0 22.50 22.50 22.50 22.50
## CV residual      -14.3  6.46 -10.28 -11.8 17.4  6.04  3.39 -6.22  3.39
##                     55    73    79   83    87    95   100   131   147  167
## Predicted         36.3  7.96  7.95 12.9  15.6 43.62 27.85 28.70 136.3 25.8
## cvpred            35.0  9.92  8.95 13.5  17.0 41.89 28.04 28.04 128.1 26.2
## Survey_occupancy  22.5  0.00  0.00 22.5   0.0 45.00 22.50 22.50 160.0 40.0
## CV residual      -12.5 -9.92 -8.95  9.0 -17.0  3.11 -5.54 -5.54  31.9 13.8
##                    174   182   191
## Predicted        45.60  15.4  11.6
## cvpred           45.32  17.7  14.1
## Survey_occupancy 40.00   0.0   0.0
## CV residual      -5.32 -17.7 -14.1
##
## Sum of squares = 3419    Mean square = 155    n = 22
##
## fold 4
## Observations in test set: 22
##                      3    11    17    18    27    45   57    69    82
## Predicted         17.2 12.24 32.38  10.6  19.0  16.3 35.7 21.02  9.60
## cvpred            16.4  9.36 31.65  10.5  23.2  19.5 35.5 18.13  7.97
## Survey_occupancy   0.0 22.50 22.50   0.0   0.0   0.0 45.0 22.50 67.50
## CV residual      -16.4 13.14 -9.15 -10.5 -23.2 -19.5  9.5  4.37 59.53
##                    103   107   110   127   134   145  154  195  203   204
## Predicted        19.65  47.5 63.29 22.75 11.82  81.1 68.1 47.1 48.5 47.59
## cvpred           18.05  52.5 60.28 20.67  8.23  72.3 65.8 39.9 39.6 46.33
## Survey_occupancy 22.50  22.5 67.50 22.50 22.50 120.0 80.0 80.0 80.0 40.00
## CV residual       4.45 -30.0  7.22  1.83 14.27  47.7 14.2 40.1 40.4 -6.33
##                    206   208   210
## Predicted         6.46 10.28  10.5
## cvpred            4.38  7.83  12.9
## Survey_occupancy 40.00  0.00   0.0
## CV residual      35.62 -7.83 -12.9
##
## Sum of squares = 13634    Mean square = 620    n = 22
##
## fold 5
## Observations in test set: 22
##                      7    33    47   53   60    70    75    86   91    92
```

```
## Predicted        15.46 27.21 22.26 25.0 32.4 22.06  25.9  33.8 46.9  20.7
## cvpred           15.84 27.58 21.15 23.8 31.2 20.97  27.1  35.7 44.8  22.2
## Survey_occupancy 22.50 22.50 22.50 45.0 45.0 22.50   0.0  22.5 67.5   0.0
## CV residual       6.66 -5.08  1.35 21.2 13.8  1.53 -27.1 -13.2 22.7 -22.2
##                    98   106    114  118  139   141  142  158   168   176
## Predicted        12.0 63.28 -0.488 26.2 14.6  5.28 14.0 23.9  54.3  50.0
## cvpred           10.5 63.47 -7.939 23.6 12.1  2.95 11.6 23.6  56.4  52.1
## Survey_occupancy 22.5 67.50 22.500 45.0 45.0  0.00 45.0 40.0  40.0  40.0
## CV residual      12.0  4.03 30.439 21.4 32.9 -2.95 33.4 16.4 -16.4 -12.1
##                    202   213
## Predicted         22.2  7.55
## cvpred            23.1  6.15
## Survey_occupancy   0.0  0.00
## CV residual      -23.1 -6.15
##
## Sum of squares = 7635    Mean square = 347    n = 22
##
## fold 6
## Observations in test set: 22
##                      5     9    61    62    64   85   126   128   137
## Predicted        17.10  12.2 23.70  43.9 22.66 39.3 38.73  10.7  9.10
## cvpred           17.11  11.9 24.29  45.8 25.13 36.2 36.46  11.1  9.71
## Survey_occupancy 22.50   0.0 22.50  22.5 22.50 67.5 45.00   0.0  0.00
## CV residual       5.39 -11.9 -1.79 -23.3 -2.63 31.3  8.54 -11.1 -9.71
##                    143   151   156  157   159   169   170   172  173  184
## Predicted         13.5  26.0 31.50 46.2  78.5 45.60  53.0 75.37 57.1 42.9
## cvpred            14.0  23.8 30.01 45.7  79.9 41.29  52.2 76.01 53.5 36.4
## Survey_occupancy   0.0   0.0 40.00 80.0  40.0 40.00  40.0 80.00 80.0 80.0
## CV residual      -14.0 -23.8  9.99 34.3 -39.9 -1.29 -12.2  3.99 26.5 43.6
##                    197   200  207
## Predicted        41.0 10.76 17.3
## cvpred           37.5  7.81 14.8
## Survey_occupancy 80.0  0.00 80.0
## CV residual      42.5 -7.81 65.2
##
## Sum of squares = 14513    Mean square = 660    n = 22
##
## fold 7
## Observations in test set: 22
##                       15   29    37   58    66    68   77    93    99   101
## Predicted         22.6 25.0  17.4 24.3  31.9  42.3 32.2 22.39 17.47 66.55
## cvpred            23.6 24.5  17.5 25.4  33.3  44.1 32.9 20.61 15.81 66.04
## Survey_occupancy   0.0 45.0   0.0 45.0   0.0  22.5 45.0 22.50 22.50 67.50
## CV residual      -23.6 20.5 -17.5 19.6 -33.3 -21.6 12.1  1.89  6.69  1.46
##                    104   111    120  130   132  144  146   153  166  175
## Predicted        42.5 10.43 23.492 40.2 14.02 12.4 30.4  15.1 30.1 20.8
## cvpred           41.4  6.38 23.118 40.9 13.93 12.2 29.8  14.0 27.7 18.1
## Survey_occupancy 45.0 22.50 22.500 67.5 22.50 22.5 40.0   0.0 40.0 40.0
## CV residual       3.6 16.12 -0.618 26.6  8.57 10.3 10.2 -14.0 12.3 21.9
##                    185   214
## Predicted         13.2  21.7
## cvpred            11.4  20.9
## Survey_occupancy  40.0   0.0
## CV residual       28.6 -20.9
```

```
##
## Sum of squares = 6795    Mean square = 309    n = 22
##
## fold 8
## Observations in test set: 21
##                      16    38   51   63    74   102   109   122   129   162
## Predicted         13.3  21.8 34.8 11.2  6.31 37.66  3.88  32.2   8.0  43.0
## cvpred            14.8  22.7 34.4 10.5  8.78 38.09  5.39  32.6  10.2  45.1
## Survey_occupancy   0.0   0.0 45.0 22.5  0.00 45.00  0.00  22.5   0.0   0.0
## CV residual      -14.8 -22.7 10.6 12.0 -8.78  6.91 -5.39 -10.1 -10.2 -45.1
##                     164   178   179   186  188   192   196   201   209
## Predicted         48.3  54.3 45.60  49.4 57.4  50.8  14.3  4.27  4.27
## cvpred            52.4  58.3 49.72  54.1 58.9  51.7  15.2  5.47  5.47
## Survey_occupancy  40.0  40.0 40.00  40.0 80.0  40.0   0.0  0.00  0.00
## CV residual      -12.4 -18.3 -9.72 -14.1 21.1 -11.7 -15.2 -5.47 -5.47
##                     212   215
## Predicted        34.85  42.7
## cvpred           35.38  47.6
## Survey_occupancy 40.00   0.0
## CV residual       4.62 -47.6
##
## Sum of squares = 7321    Mean square = 349    n = 21
##
## fold 9
## Observations in test set: 21
##                       26   32    41    43    52    71     84   97     115
## Predicted        26.67 21.7 23.41 14.67  19.5  40.1 22.155 29.5 61.1107
## cvpred           26.43 19.5 26.69 16.74  21.0  43.1 22.818 28.7 67.4196
## Survey_occupancy 22.50 22.5 22.50 22.50   0.0  22.5 22.500 67.5 67.5000
## CV residual      -3.93  3.0 -4.19  5.76 -21.0 -20.6 -0.318 38.8  0.0804
##                     116   119   124  152   160  163   177    187   193
## Predicted         31.2  42.1 46.42 61.5  11.9 50.0  63.9   9.94 106.0
## cvpred            45.3  47.0 51.95 64.2  10.1 47.9  65.7  10.65 121.3
## Survey_occupancy   0.0   0.0 45.00 80.0   0.0 80.0  40.0   0.00  40.0
## CV residual      -45.3 -47.0 -6.95 15.8 -10.1 32.1 -25.7 -10.65 -81.3
##                     194  198   216
## Predicted        35.54 74.9  3.73
## cvpred           37.31 85.8  2.23
## Survey_occupancy 40.00 80.0  0.00
## CV residual       2.69 -5.8 -2.23
##
## Sum of squares = 15555    Mean square = 741    n = 21
##
## fold 10
## Observations in test set: 21
##                       10   14    23    31    36    39    44   46    50    59
## Predicted        24.7 12.2  14.7 18.43  19.5 16.86 11.94 35.4 18.44 13.93
## cvpred           23.8 11.5  17.4 19.08  20.2 14.65  9.61 33.2 15.79 14.27
## Survey_occupancy 45.0 22.5   0.0 22.50   0.0 22.50  0.00 67.5 22.50 22.50
## CV residual      21.2 11.0 -17.4  3.42 -20.2  7.85 -9.61 34.3  6.71  8.23
##                     65    78    88   113   133   150   155 161   180  181
## Predicted        17.15  7.41  9.59 20.77  7.46 48.39  21.1  31  15.9 44.0
## cvpred           15.39  8.51  9.04 20.62  6.18 48.61  22.9  25  19.2 40.5
## Survey_occupancy 22.50  0.00  0.00 22.50 22.50 40.00   0.0  80   0.0 80.0
```

```
## CV residual       7.11 -8.51 -9.04  1.88 16.32 -8.61 -22.9  55 -19.2 39.5
##                   183
## Predicted        66.7
## cvpred           60.1
## Survey_occupancy 80.0
## CV residual      19.9
##
## Sum of squares = 9160    Mean square = 436    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 414
```

Models	MSE
Survey_occupancy ~ 1	`attr(null.model, "ms")`
Survey_occupancy ~ Wifi_Max_logs	`attr(lm.max, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room	`attr(lm.max.room, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Factor_Time	`attr(lm.max.time, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Course_Level	`attr(lm.max.level, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room + Factor_Time	`attr(lm.max.room.time, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room + Course_Level	`attr(lm.max.room.level, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Factor_Time + Course_Level	`attr(lm.max.time.level, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room + Factor_Time + Course_Level	`attr(lm.max.full, "ms")`

The model with the lowest MSE was the model: Survey_occupancy ~ Wifi_Max_logs. However, its MSE was slightly higher than the previous best model. Therefore we are going to run the Survey_occupancy ~ Wifi_Average_logs on the whole dataset.

Looking at the model summary, the Wifi_Average_logs were significantly related to the Survey ground truth data. “‘{r}summary(occupancy.lm.avg)“‘ However when we looked at the residuals, there were few issues. As it could be seen below from the plot, showing the fitted values plotted againist the residuals, the target features had a lot values closed together similarly to what expected from a categorical features and there were a potential outliers (fitted values > 140). The observations seemed normally distributed, but the variance did not seem homogeneous.

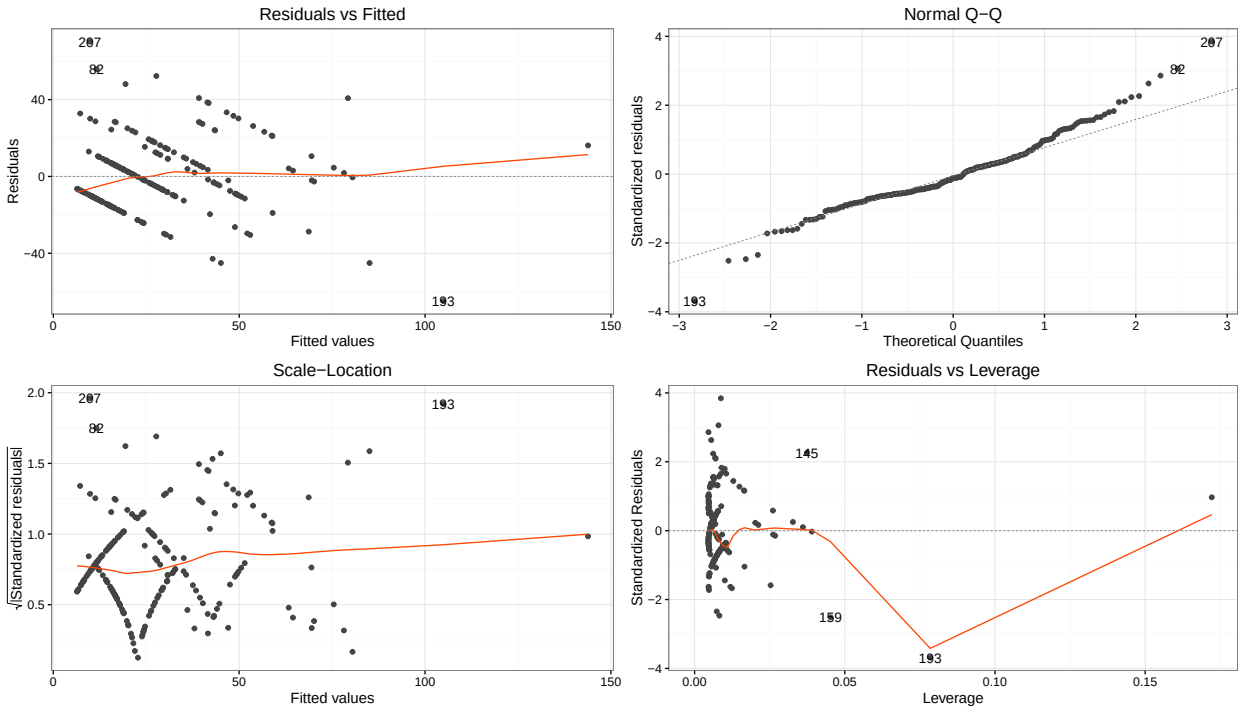
```
library(ggfortify)
```

```
## Warning: package 'ggfortify' was built under R version 3.2.5
```

```
class(autoplot(occupancy.lm.avg))
```

```
## [1] "ggmultiplot"
## attr(,"package")
## [1] "ggfortify"
```

```
autoplot(occupancy.lm.avg, smooth.colour = 'orangered') + theme_bw()
```



Removing the outliers

For deciding which observations remove we decided to looked at the histograms (see above), which showed that for Wifi Average logs and Maximum logs had potential outliers when the values were higher than 140, while for the Survey occupancy observation higher than 120 seemed outliers. Only 3 observations were removed and we did not lose too much data.

```
## [1] 213  14
```

```
##       Room          Date                Time         Module
##  Min.   :1.00   Length:213         Min.   : 9.0   Length:213
##  1st Qu.:1.00   Class :character   1st Qu.:11.0   Class :character
##  Median :2.00   Mode  :character   Median :13.0   Mode  :character
##  Mean   :1.99                      Mean   :12.5
##  3rd Qu.:3.00                      3rd Qu.:15.0
##  Max.   :3.00                      Max.   :16.0
##  Course_Level    Tutorial     Double_module Class_went_ahead    Capacity
##  0:59         Min.   :0.000   0:209         0: 22            Min.   : 90
##  1:13         1st Qu.:0.000   1:  4         1:191            1st Qu.: 90
##  2:23         Median :0.000                                  Median : 90
##  3:74         Mean   :0.028                                  Mean   :113
##  4:40         3rd Qu.:0.000                                  3rd Qu.:160
##  5: 4         Max.   :1.000                                  Max.   :160
##  Percentage_room_full Wifi_Average_logs Wifi_Max_logs   Survey_occupancy
##  Min.   :0.000        Min.   :  0.0     Min.   :  0.0   Min.   : 0.0
##  1st Qu.:0.000        1st Qu.: 11.5     1st Qu.: 18.0   1st Qu.: 0.0
##  Median :0.250        Median : 22.9     Median : 32.0   Median :22.5
##  Mean   :0.244        Mean   : 28.7     Mean   : 38.1   Mean   :26.9
##  3rd Qu.:0.250        3rd Qu.: 41.2     3rd Qu.: 54.0   3rd Qu.:40.0
```

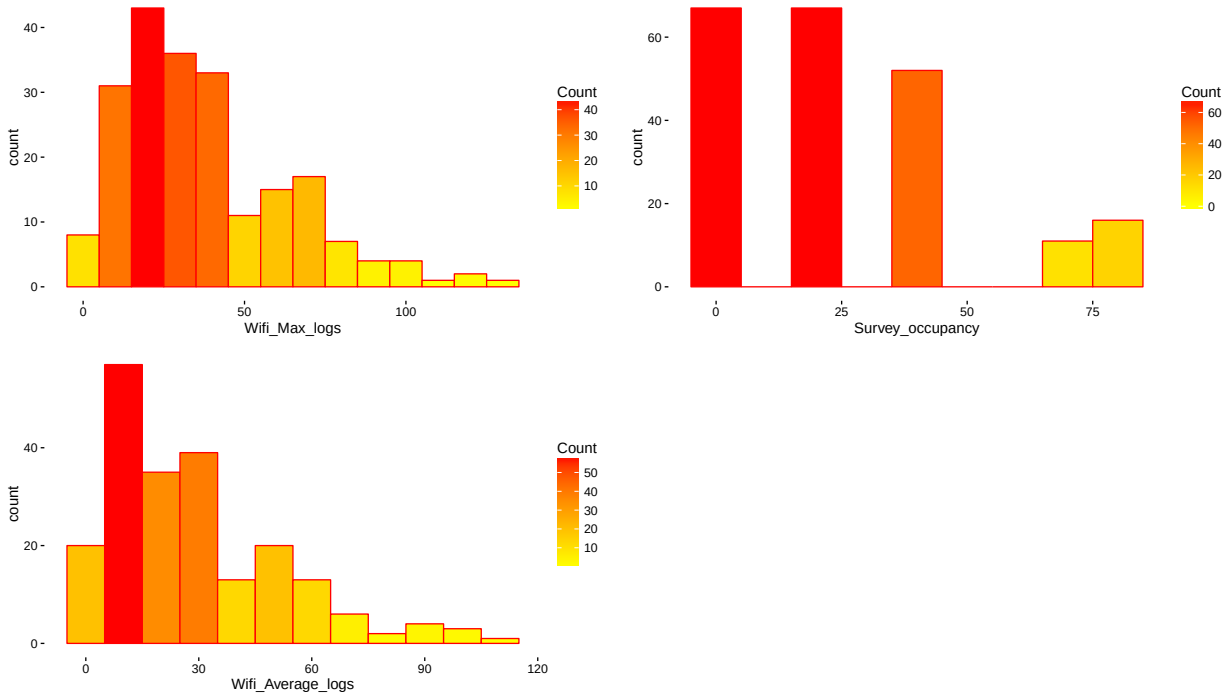
```
##  Max.   :0.750        Max.   :110.4     Max.   :127.0   Max.   :80.0
##           Factor_Time
##  Early Morning  :52
##  Late Morning   :54
##  Early Afternoon:53
##  Late Afternoon :54
##
##
```

The histograms were re-plotted to see whether there was an improvement.

```
#histogram for showing the count in each bin for the Maximum number of clients
histo1 <- ggplot(NoOutlierTable, aes(x = Wifi_Max_logs)) + geom_histogram(binwidth = 10,  col="red", aes

#histogram for showing the count in each bin for the Average number of clients
histo2 <- ggplot(NoOutlierTable, aes(x = Wifi_Average_logs)) + geom_histogram(binwidth = 10,  col="red"

#histogram for showing the count in each bin for the number of clients counted with the survey
histo3 <- ggplot(NoOutlierTable, aes(x = Survey_occupancy)) + geom_histogram(binwidth = 10,  col="red",
#plot all the histograms in one window
multiplot(histo1, histo2, histo3, cols=2)
```

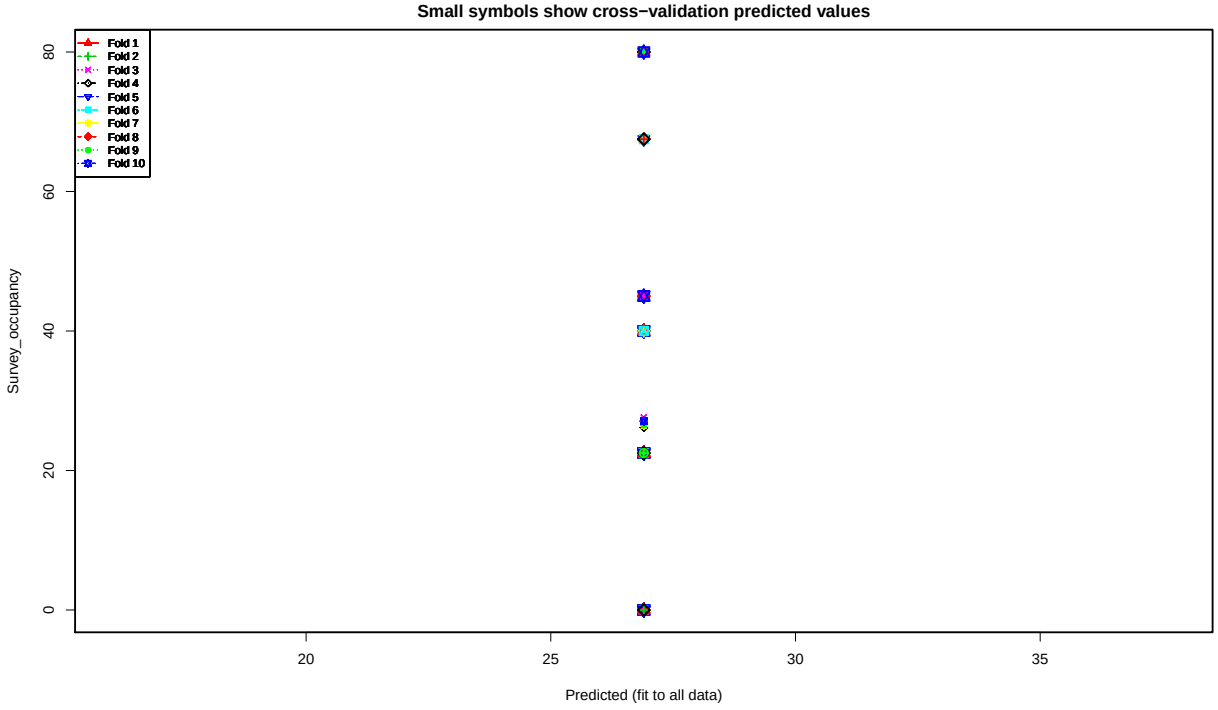


The histograms for the Wi-Fi logs seemed improved, while Survey data were still scatterd similar to a Poisson distribution. We decided to run the linear regression and see if there was any improvements.

CASE 1: MODEL SELECTION WITH RESPONSE VARIABLE AVERAGE CLIENTS WITHOUT OUTLIERS

All the models ran with the response variable Wifi average logs are summarised in the following table showing their MSE.

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##            Df Sum Sq Mean Sq F value Pr(>F)
## Residuals 212 125692     593
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19    30    34    48    54    76    89
## Predicted          26.9 26.90 26.9 26.9 26.90 26.90 26.90 26.90 26.90  26.9
## cvpred             27.1 27.07 27.1 27.1 27.07 27.07 27.07 27.07 27.07  27.1
## Survey_occupancy    0.0 22.50 45.0 45.0 22.50 22.50 22.50 22.50 22.50   0.0
## CV residual       -27.1 -4.57 17.9 17.9 -4.57 -4.57 -4.57 -4.57 -4.57 -27.1
##                      120   122   134   136  168  188   196   202  203  206
## Predicted          26.90 26.90 26.90  26.9 26.9 26.9  26.9  26.9 26.9 26.9
## cvpred             27.07 27.07 27.07  27.1 27.1 27.1  27.1  27.1 27.1 27.1
## Survey_occupancy   22.50 22.50 22.50   0.0 40.0 80.0   0.0   0.0 80.0 40.0
## CV residual        -4.57 -4.57 -4.57 -27.1 12.9 52.9 -27.1 -27.1 52.9 12.9
##                      213
## Predicted          26.9
## cvpred             27.1
## Survey_occupancy    0.0
## CV residual       -27.1
##
## Sum of squares = 11165    Mean square = 532    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18    42    47    74    86   91  106   107
```

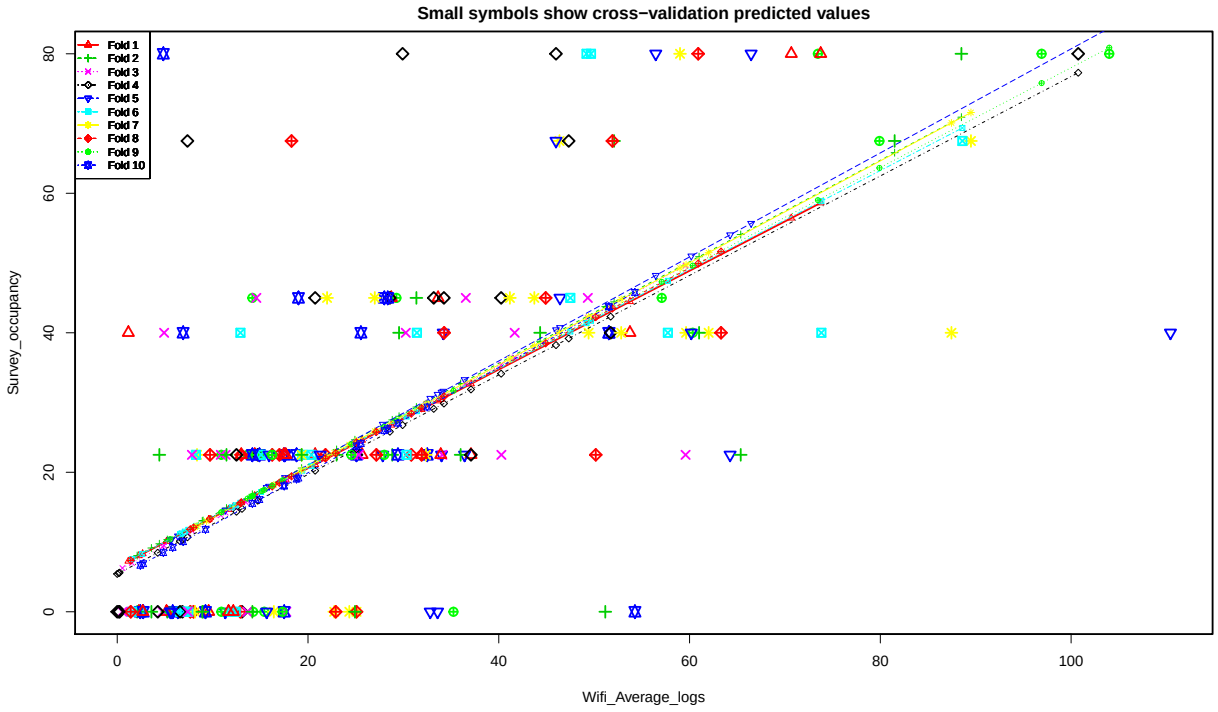
```
## Predicted         26.9 26.90  26.9 26.90 26.90  26.9 26.90 26.9 26.9 26.90
## cvpred            27.2 27.19  27.2 27.19 27.19  27.2 27.19 27.2 27.2 27.19
## Survey_occupancy   0.0 22.50   0.0 22.50 22.50   0.0 22.50 67.5 67.5 22.50
## CV residual      -27.2 -4.69 -27.2 -4.69 -4.69 -27.2 -4.69 40.3 40.3 -4.69
##                    118   125   133  146   160  174  176   182  183   189
## Predicted        26.9 26.90 26.90 26.9  26.9 26.9 26.9  26.9 26.9  26.9
## cvpred           27.2 27.19 27.19 27.2  27.2 27.2 27.2  27.2 27.2  27.2
## Survey_occupancy 45.0 22.50 22.50 40.0   0.0 40.0 40.0   0.0 80.0   0.0
## CV residual      17.8 -4.69 -4.69 12.8 -27.2 12.8 12.8 -27.2 52.8 -27.2
##                    191   215
## Predicted         26.9  26.9
## cvpred            27.2  27.2
## Survey_occupancy   0.0   0.0
## CV residual      -27.2 -27.2
##
## Sum of squares = 12916    Mean square = 587    n = 22
##
## fold 3
## Observations in test set: 22
##                      1    2    7    27   40   55   57   62   69    79
## Predicted         26.9 26.9 26.9  26.9 26.9 26.9 26.9 26.9 26.9  26.9
## cvpred            27.6 27.6 27.6  27.6 27.6 27.6 27.6 27.6 27.6  27.6
## Survey_occupancy   0.0 22.5 22.5   0.0 22.5 22.5 45.0 22.5 22.5   0.0
## CV residual      -27.6 -5.1 -5.1 -27.6 -5.1 -5.1 17.4 -5.1 -5.1 -27.6
##                     92   95   98  103  108   128  139  166  175   187  194
## Predicted         26.9 26.9 26.9 26.9 26.9  26.9 26.9 26.9 26.9  26.9 26.9
## cvpred            27.6 27.6 27.6 27.6 27.6  27.6 27.6 27.6 27.6  27.6 27.6
## Survey_occupancy   0.0 45.0 22.5 22.5 22.5   0.0 45.0 40.0 40.0   0.0 40.0
## CV residual      -27.6 17.4 -5.1 -5.1 -5.1 -27.6 17.4 12.4 12.4 -27.6 12.4
##                    209
## Predicted         26.9
## cvpred            27.6
## Survey_occupancy   0.0
## CV residual      -27.6
##
## Sum of squares = 6937    Mean square = 315    n = 22
##
## fold 4
## Observations in test set: 22
##                      3     5   29    45   53   58   60   67    70   82
## Predicted         26.9 26.90 26.9  26.9 26.9 26.9 26.9 26.9 26.90 26.9
## cvpred            26.2 26.18 26.2  26.2 26.2 26.2 26.2 26.2 26.18 26.2
## Survey_occupancy   0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.5
## CV residual      -26.2 -3.68 18.8 -26.2 18.8 18.8 18.8 18.8 -3.68 41.3
##                    130   135   140   141  161  172   180  186  197   201
## Predicted        26.9 26.90 26.90  26.9 26.9 26.9  26.9 26.9 26.9  26.9
## cvpred           26.2 26.18 26.18  26.2 26.2 26.2  26.2 26.2 26.2  26.2
## Survey_occupancy 67.5 22.50 22.50   0.0 80.0 80.0   0.0 40.0 80.0   0.0
## CV residual      41.3 -3.68 -3.68 -26.2 53.8 53.8 -26.2 13.8 53.8 -26.2
##                    210   216
## Predicted         26.9  26.9
## cvpred            26.2  26.2
## Survey_occupancy   0.0   0.0
## CV residual      -26.2 -26.2
```

```
##
## Sum of squares = 18919    Mean square = 860    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32    33    61    64    66    68    75    80
## Predicted         26.9 26.90 26.90 26.90 26.90  26.9 26.90  26.9  26.9
## cvpred            27.0 26.98 26.98 26.98 26.98  27.0 26.98  27.0  27.0
## Survey_occupancy   0.0 22.50 22.50 22.50 22.50   0.0 22.50   0.0   0.0
## CV residual      -27.0 -4.48 -4.48 -4.48 -4.48 -27.0 -4.48 -27.0 -27.0
##                     85  102   127   132  156  159  163   171  192  195
## Predicted        26.9 26.9 26.90 26.90 26.9 26.9 26.9  26.9 26.9 26.9
## cvpred           27.0 27.0 26.98 26.98 27.0 27.0 27.0  27.0 27.0 27.0
## Survey_occupancy 67.5 45.0 22.50 22.50 40.0 40.0 80.0   0.0 40.0 80.0
## CV residual      40.5 18.0 -4.48 -4.48 13.0 13.0 53.0 -27.0 13.0 53.0
##                     208   214
## Predicted         26.9  26.9
## cvpred            27.0  27.0
## Survey_occupancy   0.0   0.0
## CV residual      -27.0 -27.0
##
## Sum of squares = 13333    Mean square = 635    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63    72    73    93    99  104   109   111  115
## Predicted         26.9 26.90 26.90  26.9 26.90 26.90 26.9  26.9 26.90 26.9
## cvpred            27.0 27.01 27.01  27.0 27.01 27.01 27.0  27.0 27.01 27.0
## Survey_occupancy   0.0 22.50 22.50   0.0 22.50 22.50 45.0   0.0 22.50 67.5
## CV residual      -27.0 -4.51 -4.51 -27.0 -4.51 -4.51 18.0 -27.0 -4.51 40.5
##                     137   143   153   155  158  181  184  190  199   200
## Predicted         26.9  26.9  26.9  26.9 26.9 26.9 26.9 26.9 26.9  26.9
## cvpred            27.0  27.0  27.0  27.0 27.0 27.0 27.0 27.0 27.0  27.0
## Survey_occupancy   0.0   0.0   0.0   0.0 40.0 80.0 80.0 40.0 40.0   0.0
## CV residual      -27.0 -27.0 -27.0 -27.0 13.0 53.0 53.0 13.0 13.0 -27.0
##                     212
## Predicted        26.9
## cvpred           27.0
## Survey_occupancy 40.0
## CV residual      13.0
##
## Sum of squares = 14192    Mean square = 676    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20    23    38    41   46   51    52   81   100
## Predicted         26.9 26.90  26.9  26.9 26.90 26.9 26.9  26.9 26.9 26.90
## cvpred            26.4 26.39  26.4  26.4 26.39 26.4 26.4  26.4 26.4 26.39
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.0   0.0 45.0 22.50
## CV residual      -26.4 -3.89 -26.4 -26.4 -3.89 41.1 18.6 -26.4 18.6 -3.89
##                     105  110   119  124   129  150  157  164  170  177  204
## Predicted        26.9 26.9  26.9 26.9  26.9 26.9 26.9 26.9 26.9 26.9 26.9
## cvpred           26.4 26.4  26.4 26.4  26.4 26.4 26.4 26.4 26.4 26.4 26.4
## Survey_occupancy 45.0 67.5   0.0 45.0   0.0 40.0 80.0 40.0 40.0 40.0 40.0
```

```
## CV residual      18.6 41.1 -26.4 18.6 -26.4 13.6 53.6 13.6 13.6 13.6 13.6
##
## Sum of squares = 12789    Mean square = 609    n = 21
##
## fold 8
## Observations in test set: 21
##                      14    24    26    44    50    65    71    84    87
## Predicted        26.90 26.90 26.90  26.9 26.90 26.90 26.90 26.90  26.9
## cvpred           27.02 27.02 27.02  27.0 27.02 27.02 27.02 27.02  27.0
## Survey_occupancy 22.50 22.50 22.50   0.0 22.50 22.50 22.50 22.50   0.0
## CV residual      -4.52 -4.52 -4.52 -27.0 -4.52 -4.52 -4.52 -4.52 -27.0
##                     88   97   114   116  121  126   131   151  165  167
## Predicted         26.9 26.9 26.90  26.9 26.9 26.9 26.90  26.9 26.9 26.9
## cvpred            27.0 27.0 27.02  27.0 27.0 27.0 27.02  27.0 27.0 27.0
## Survey_occupancy   0.0 67.5 22.50   0.0 67.5 45.0 22.50   0.0 40.0 40.0
## CV residual      -27.0 40.5 -4.52 -27.0 40.5 18.0 -4.52 -27.0 13.0 13.0
##                    173   211
## Predicted        26.9  26.9
## cvpred           27.0  27.0
## Survey_occupancy 80.0   0.0
## CV residual      53.0 -27.0
##
## Sum of squares = 11309    Mean square = 539    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59   96
## Predicted        26.9 26.90 26.9 26.90  26.9  26.9 26.90  26.9 26.90 26.9
## cvpred           26.5 26.51 26.5 26.51  26.5  26.5 26.51  26.5 26.51 26.5
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.0
## CV residual      18.5 -4.01 18.5 -4.01 -26.5 -26.5 -4.01 -26.5 -4.01 18.5
##                    101   113   117   123   144   148  152  154  178  198
## Predicted        26.9 26.90  26.9 26.90 26.90  26.9 26.9 26.9 26.9 26.9
## cvpred           26.5 26.51  26.5 26.51 26.51  26.5 26.5 26.5 26.5 26.5
## Survey_occupancy 67.5 22.50   0.0 22.50 22.50   0.0 80.0 80.0 40.0 80.0
## CV residual      41.0 -4.01 -26.5 -4.01 -4.01 -26.5 53.5 53.5 13.5 53.5
##                    205
## Predicted         26.9
## cvpred            26.5
## Survey_occupancy   0.0
## CV residual      -26.5
##
## Sum of squares = 15801    Mean square = 752    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21    22    35    43    49   77    78
## Predicted         26.9  26.9 26.90 26.90 26.90 26.90 26.90 26.9  26.9
## cvpred            27.1  27.1 27.07 27.07 27.07 27.07 27.07 27.1  27.1
## Survey_occupancy   0.0   0.0 22.50 22.50 22.50 22.50 22.50 45.0   0.0
## CV residual      -27.1 -27.1 -4.57 -4.57 -4.57 -4.57 -4.57 17.9 -27.1
##                     83   90    94   112   138  142  149   162  169  179
## Predicted        26.90 26.9 26.90  26.9  26.9 26.9 26.9  26.9 26.9 26.9
## cvpred           27.07 27.1 27.07  27.1  27.1 27.1 27.1  27.1 27.1 27.1
```

```
## Survey_occupancy 22.50 45.0 22.50   0.0   0.0 45.0 40.0   0.0 40.0 40.0
## CV residual      -4.57 17.9 -4.57 -27.1 -27.1 17.9 12.9 -27.1 12.9 12.9
##                   185  207
## Predicted        26.9 26.9
## cvpred           27.1 27.1
## Survey_occupancy 40.0 80.0
## CV residual      12.9 52.9
##
## Sum of squares = 8978    Mean square = 428    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 593

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                    Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs   1  59964   59964     192 <2e-16 ***
## Residuals         211  65728     312
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19    30    34    48    54    76
## Wifi_Average_logs   2.27 14.42 33.6 28.7 20.75  37.1 31.91 17.67 25.67
## cvpred              8.03 16.63 30.2 26.8 21.11  32.7 29.01 18.93 24.59
## Survey_occupancy    0.00 22.50 45.0 45.0 22.50  22.5 22.50 22.50 22.50
```

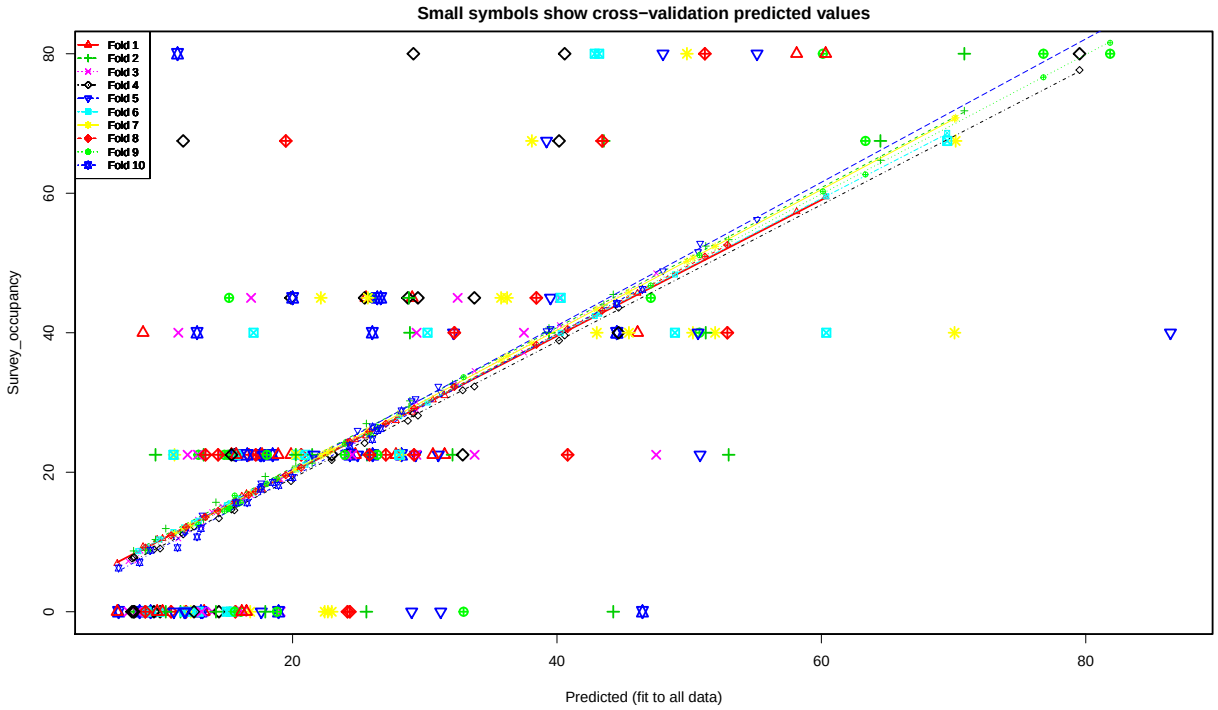
```
## CV residual       -8.03  5.87 14.8 18.2  1.39 -10.2 -6.51  3.57 -2.09
##                      89   120   122   134    136   168  188   196   202
## Wifi_Average_logs   5.17 17.45 33.92 13.00   9.58 53.75 73.8  12.2  11.7
## cvpred             10.08 18.78 30.43 15.63  13.21 44.47 58.6  15.0  14.7
## Survey_occupancy    0.00 22.50 22.50 22.50   0.00 40.00 80.0   0.0   0.0
## CV residual       -10.08  3.72 -7.93  6.87 -13.21 -4.47 21.4 -15.0 -14.7
##                     203   206   213
## Wifi_Average_logs 70.7  1.17  2.67
## cvpred            56.4  7.25  8.31
## Survey_occupancy  80.0 40.00  0.00
## CV residual       23.6 32.75 -8.31
##
## Sum of squares = 3830    Mean square = 182    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18    42     47    74    86   91   106
## Wifi_Average_logs   5.25 28.83   9.0 11.45 23.000  2.09  36.0 52.1 81.50
## cvpred             10.36 27.51  13.1 14.87 23.267  8.06  32.7 44.4 65.82
## Survey_occupancy    0.00 22.50   0.0 22.50 22.500  0.00  22.5 67.5 67.50
## CV residual       -10.36 -5.01 -13.1  7.63 -0.767 -8.06 -10.2 23.1  1.68
##                      107  118  125   133  146   160   174   176   182   183
## Wifi_Average_logs  65.4 31.4 19.3  4.42 29.5  3.58 44.33  61.0  14.2 88.50
## cvpred             54.1 29.4 20.6  9.75 28.0  9.14 38.79  50.9  16.8 70.91
## Survey_occupancy   22.5 45.0 22.5 22.50 40.0  0.00 40.00  40.0   0.0 80.00
## CV residual       -31.6 15.6  1.9 12.75 12.0 -9.14  1.21 -10.9 -16.8  9.09
##                      189    191   215
## Wifi_Average_logs  24.9   8.92  51.2
## cvpred             24.7  13.02  43.8
## Survey_occupancy    0.0   0.00   0.0
## CV residual       -24.7 -13.02 -43.8
##
## Sum of squares = 5881    Mean square = 267    n = 22
##
## fold 3
## Observations in test set: 22
##                        1     2     7    27    40    55    57    62    69
## Wifi_Average_logs  4.75 13.45 11.36  12.4 10.86  40.3 49.33  59.6 34.08
## cvpred             9.35 15.74 14.21  14.9 13.84  35.4 42.09  49.6 30.89
## Survey_occupancy   0.00 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.50
## CV residual       -9.35  6.76  8.29 -14.9  8.66 -12.9  2.91 -27.1 -8.39
##                      79    92   95    98   103   108   128  139  166   175
## Wifi_Average_logs  1.55  17.7 36.5  7.83 24.75 25.33  13.6 14.6 30.2  4.92
## cvpred             7.00  18.9 32.7 11.61 24.04 24.47  15.9 16.6 28.1  9.47
## Survey_occupancy   0.00   0.0 45.0 22.50 22.50 22.50   0.0 45.0 40.0 40.00
## CV residual       -7.00 -18.9 12.3 10.89 -1.54 -1.97 -15.9 28.4 11.9 30.53
##                     187   194    209
## Wifi_Average_logs   7.4 41.67  0.545
## cvpred             11.3 36.46  6.262
## Survey_occupancy    0.0 40.00  0.000
## CV residual       -11.3  3.54 -6.262
##
## Sum of squares = 4477    Mean square = 204    n = 22
##
```

```
## fold 4
## Observations in test set: 22
##                         3     5   29    45   53   58   60   67     70    82
## Wifi_Average_logs    6.83 14.73 33.2  13.1 28.6 34.2 40.2 20.8 25.083  7.36
## cvpred              10.30 15.93 29.1  14.8 25.8 29.9 34.1 20.2 23.317 10.68
## Survey_occupancy     0.00 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.500 67.50
## CV residual        -10.30  6.57 15.9 -14.8 19.2 15.1 10.9 24.8 -0.817 56.82
##                      130   135   140   141  161    172    180   186  197
## Wifi_Average_logs 47.3 37.08 12.50  4.25 29.9 100.75   6.58 51.73 46.0
## cvpred            39.2 31.88 14.34  8.46 26.8  77.28  10.12 42.32 38.2
## Survey_occupancy  67.5 22.50 22.50  0.00 80.0  80.00   0.00 40.00 80.0
## CV residual       28.3 -9.38  8.16 -8.46 53.2   2.72 -10.12 -2.32 41.8
##                       201   210    216
## Wifi_Average_logs  0.25  0.00  0.167
## cvpred             5.61  5.43  5.546
## Survey_occupancy   0.00  0.00  0.000
## CV residual       -5.61 -5.43 -5.546
##
## Sum of squares = 10992    Mean square = 500    n = 22
##
## fold 5
## Observations in test set: 21
##                        16    32    33    61    64    66    68    75     80
## Wifi_Average_logs  11.3 17.58 34.00 27.83  36.4  33.6  64.2  15.7   6.36
## cvpred             14.6 19.24 31.48 26.88  33.3  31.2  54.0  17.8  10.87
## Survey_occupancy    0.0 22.50 22.50 22.50  22.5   0.0  22.5   0.0   0.00
## CV residual       -14.6  3.26 -8.98 -4.38 -10.8 -31.2 -31.5 -17.8 -10.87
##                       85   102    127   132   156   159  163   171   192
## Wifi_Average_logs 46.0 46.42 21.273 15.92 34.18 110.4 56.5  32.8  60.2
## cvpred            40.4 40.74 21.988 17.99 31.62  88.5 48.2  30.6  51.0
## Survey_occupancy  67.5 45.00 22.500 22.50 40.00  40.0 80.0   0.0  40.0
## CV residual       27.1  4.26  0.512  4.51  8.38 -48.5 31.8 -30.6 -11.0
##                      195    208    214
## Wifi_Average_logs 66.5   5.58   5.67
## cvpred            55.7  10.29  10.35
## Survey_occupancy  80.0   0.00   0.00
## CV residual       24.3 -10.29 -10.35
##
## Sum of squares = 8903    Mean square = 424    n = 21
##
## fold 6
## Observations in test set: 21
##                         9    63    72    73    93    99   104 109   111
## Wifi_Average_logs   6.75 15.08  8.25  2.58 19.40 20.36 47.50  12 30.33
## cvpred             11.25 17.16 12.31  8.29 20.23 20.91 40.18  15 27.99
## Survey_occupancy    0.00 22.50 22.50  0.00 22.50 22.50 45.00   0 22.50
## CV residual       -11.25  5.34 10.19 -8.29  2.27  1.59  4.82 -15 -5.49
##                       115    137   143    153    155  158  181  184   190
## Wifi_Average_logs 88.60   7.45  12.4   6.58   7.08 31.4 49.7 49.2  73.8
## cvpred            69.37  11.75  15.3  11.13  11.48 28.8 41.7 41.4  58.9
## Survey_occupancy  67.50   0.00   0.0   0.00   0.00 40.0 80.0 80.0  40.0
## CV residual       -1.87 -11.75 -15.3 -11.13 -11.48 11.2 38.3 38.6 -18.9
##                       199   200  212
## Wifi_Average_logs 57.73  1.55 12.9
```

```
## cvpred            47.44  7.55 15.6
## Survey_occupancy  40.00  0.00 40.0
## CV residual       -7.44 -7.55 24.4
##
## Sum of squares = 5388    Mean square = 257    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20     23    38    41   46    51    52   81
## Wifi_Average_logs  24.3  8.36   9.36  25.1 32.36 46.4 43.73  16.4 22.0
## cvpred             24.0 12.29  13.02  24.5 29.83 40.1 38.13  18.2 22.3
## Survey_occupancy    0.0 22.50   0.00   0.0 22.50 67.5 45.00   0.0 45.0
## CV residual       -24.0 10.21 -13.02 -24.5 -7.33 27.4  6.87 -18.2 22.7
##                      100  105   110   119   124    129   150  157   164
## Wifi_Average_logs 19.33 27.0 89.50  22.8 41.17   8.17  62.0 59.0 59.64
## cvpred            20.31 25.9 71.58  22.8 36.26  12.14  51.5 49.3 49.76
## Survey_occupancy  22.50 45.0 67.50   0.0 45.00   0.00  40.0 80.0 40.00
## CV residual        2.19 19.1 -4.08 -22.8  8.74 -12.14 -11.5 30.7 -9.76
##                     170   177   204
## Wifi_Average_logs 49.42  87.5 52.83
## cvpred            42.29  70.1 44.79
## Survey_occupancy  40.00  40.0 40.00
## CV residual       -2.29 -30.1 -4.79
##
## Sum of squares = 6383    Mean square = 304    n = 21
##
## fold 8
## Observations in test set: 21
##                       14     24   26    44    50   65    71    84    87
## Wifi_Average_logs 16.25 21.833 30.8   8.0 13.00 17.0  50.2 31.91  12.9
## cvpred            17.97 21.963 28.4  12.1 15.64 18.5  42.2 29.17  15.6
## Survey_occupancy  22.50 22.500 22.5   0.0 22.50 22.5  22.5 22.50   0.0
## CV residual        4.53  0.537 -5.9 -12.1  6.86  4.0 -19.7 -6.67 -15.6
##                      88   97   114   116  121   126   131   151   165
## Wifi_Average_logs   7.67 18.3  9.73  25.1 51.9 44.92 27.17  22.9  63.3
## cvpred             11.82 19.4 13.30  24.3 43.5 38.48 25.78  22.7  51.6
## Survey_occupancy    0.00 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0
## CV residual       -11.82 48.1  9.20 -24.3 24.0  6.52 -3.28 -22.7 -11.6
##                     167  173   211
## Wifi_Average_logs 34.27 60.9  1.42
## cvpred            30.87 49.9  7.35
## Survey_occupancy  40.00 80.0  0.00
## CV residual        9.13 30.1 -7.35
##
## Sum of squares = 6391    Mean square = 304    n = 21
##
## fold 9
## Observations in test set: 21
##                       10    25   28    31    36    37    39     56    59
## Wifi_Average_logs 29.3 10.91 14.2 14.08  15.4  14.2 13.67   5.55 15.17
## cvpred            27.4 14.26 16.6 16.53  17.5  16.7 16.23  10.42 17.31
## Survey_occupancy  45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.00 22.50
## CV residual       17.6  8.24 28.4  5.97 -17.5 -16.7  6.27 -10.42  5.19
##                     96   101   113   117   123   144   148  152  154   178
```

```
## Wifi_Average_logs 57.1 79.91 28.00  17.3 24.55 16.25  10.9 73.5 96.9 60.33
## cvpred            47.3 63.63 26.49  18.9 24.02 18.08  14.3 59.0 75.8 49.63
## Survey_occupancy  45.0 67.50 22.50   0.0 22.50 22.50   0.0 80.0 80.0 40.00
## CV residual       -2.3  3.87 -3.99 -18.9 -1.52  4.42 -14.3 21.0  4.2 -9.63
##                      198   205
## Wifi_Average_logs 104.000  35.2
## cvpred             80.871  31.7
## Survey_occupancy   80.000   0.0
## CV residual        -0.871 -31.7
##
## Sum of squares = 4150    Mean square = 198    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21    22    35    43    49 77    78    83
## Wifi_Average_logs  2.42  5.82 32.50 17.50 14.91 18.80 29.43 28  2.73 14.17
## cvpred             6.66  9.23 29.36 18.04 16.09 19.02 27.04 26  6.90 15.53
## Survey_occupancy   0.00  0.00 22.50 22.50 22.50 22.50 22.50 45  0.00 22.50
## CV residual       -6.66 -9.23 -6.86  4.46  6.41  3.48 -4.54 19 -6.90  6.97
##                      90    94   112    138  142  149   162   169   179
## Wifi_Average_logs 28.4 25.08  17.5   9.25 19.0 25.5  54.3 51.55 51.55
## cvpred            26.2 23.76  18.0  11.82 19.2 24.1  45.8 43.73 43.73
## Survey_occupancy  45.0 22.50   0.0   0.00 45.0 40.0   0.0 40.00 40.00
## CV residual       18.8 -1.26 -18.0 -11.82 25.8 15.9 -45.8 -3.73 -3.73
##                     185   207
## Wifi_Average_logs  6.91  4.83
## cvpred            10.05  8.48
## Survey_occupancy  40.00 80.00
## CV residual       29.95 71.52
##
## Sum of squares = 10603    Mean square = 505    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 315


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                    Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs   1  59964   59964  192.29 <2e-16 ***
## Room                1    242     242    0.78   0.38
## Residuals         210  65486     312
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19    30    34   48    54    76    89
## Predicted           6.73 15.37 29.0 25.6 19.88 31.50 27.8 17.69 24.75  10.2
## cvpred              6.91 15.31 28.6 25.2 19.69 30.98 27.4 17.56 24.66  10.5
## Survey_occupancy    0.00 22.50 45.0 45.0 22.50 22.50 22.5 22.50 22.50   0.0
## CV residual        -6.91  7.19 16.4 19.8  2.81 -8.48 -4.9  4.94 -2.16 -10.5
##                      120   122   134   136   168  188   196   202  203   206
## Predicted          18.91 30.62 15.74  13.3 46.10 60.3  16.5  16.2 58.1  8.69
## cvpred             18.99 30.37 15.91  13.5 45.66 59.5  16.9  16.6 57.4  9.30
## Survey_occupancy   22.50 22.50 22.50   0.0 40.00 80.0   0.0   0.0 80.0 40.00
## CV residual         3.51 -7.87  6.59 -13.5 -5.66 20.5 -16.9 -16.6 22.6 30.70
##                      213
## Predicted           9.76
## cvpred             10.34
## Survey_occupancy    0.00
## CV residual       -10.34
##
## Sum of squares = 3880    Mean square = 185    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18    42    47    74    86   91    106
## Predicted           8.85 25.63  11.5 13.27 21.48  7.98  32.1 43.5 64.47
## cvpred              8.79 25.42  11.4 13.17 21.31  8.72  32.6 44.0 64.73
## Survey_occupancy    0.00 22.50   0.0 22.50 22.50  0.00  22.5 67.5 67.50
## CV residual        -8.79 -2.92 -11.4  9.33  1.19 -8.72 -10.1 23.5  2.77
##                       107   118   125   133   146   160    174   176   182
## Predicted           53.0 28.8 20.24  9.63 28.88  10.4 39.396  51.3  17.9
```

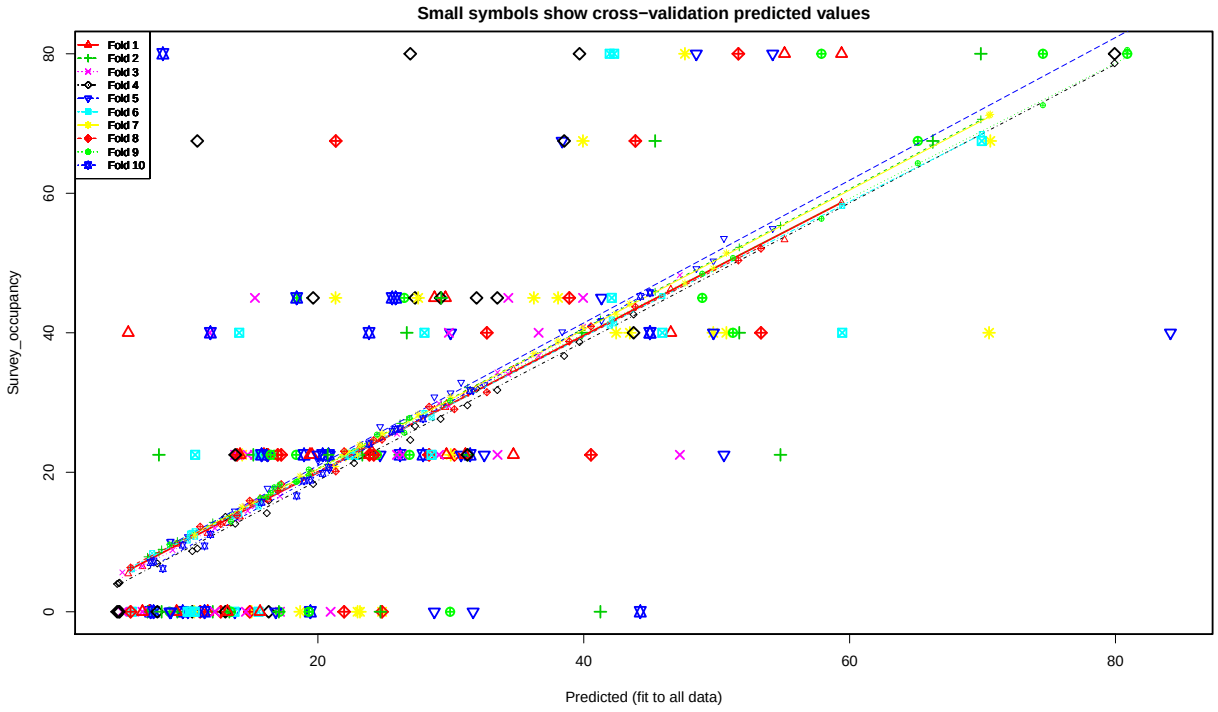
```
## cvpred            53.3 29.4 20.88 10.36 30.24  11.9 40.668  52.4  19.4
## Survey_occupancy  22.5 45.0 22.50 22.50 40.00   0.0 40.000  40.0   0.0
## CV residual      -30.8 15.6  1.62 12.14  9.76 -11.9 -0.668 -12.4 -19.4
##                    183   189   191   215
## Predicted        70.82  25.6  14.2  44.3
## cvpred           71.82  27.0  15.7  45.5
## Survey_occupancy 80.00   0.0   0.0   0.0
## CV residual       8.18 -27.0 -15.7 -45.5
##
## Sum of squares = 6268    Mean square = 285    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     7    27    40    55   57    62    69
## Predicted         8.50 14.69 13.20  13.9 12.84  33.8 40.2  47.5 29.36
## cvpred            8.76 15.07 13.56  14.3 13.19  34.5 41.1  48.5 30.04
## Survey_occupancy  0.00 22.50 22.50   0.0 22.50  22.5 45.0  22.5 22.50
## CV residual      -8.76  7.43  8.94 -14.3  9.31 -12.0  3.9 -26.0 -7.54
##                     79    92   95   98   103  108   128  139  166  175
## Predicted         7.59  19.1 32.5 12.1 24.10 24.5  16.2 16.9 29.4 11.4
## cvpred            7.25  19.0 32.6 11.8 24.08 24.5  16.0 16.7 28.9 10.5
## Survey_occupancy  0.00   0.0 45.0 22.5 22.50 22.5   0.0 45.0 40.0 40.0
## CV residual      -7.25 -19.0 12.4 10.7 -1.58 -2.0 -16.0 28.3 11.1 29.5
##                    187   194   209
## Predicted         13.1 37.50  8.25
## cvpred            12.3 37.16  7.33
## Survey_occupancy   0.0 40.00  0.00
## CV residual      -12.3  2.84 -7.33
##
## Sum of squares = 4348    Mean square = 198    n = 22
##
## fold 4
## Observations in test set: 22
##                      3     5   29    45   53   58   60   67     70   82
## Predicted         9.98 15.60 28.7  14.4 25.5 29.5 33.8 19.9 22.962 11.7
## cvpred            9.06 14.55 27.4  13.4 24.2 28.1 32.3 18.7 21.745 11.1
## Survey_occupancy  0.00 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.500 67.5
## CV residual      -9.06  7.95 17.6 -13.4 20.8 16.9 12.7 26.3  0.755 56.4
##                    130   135   140   141  161   172   180   186  197   201
## Predicted        40.2 32.87 15.38  9.51 29.1 79.53  12.5 44.66 40.6  8.04
## cvpred           38.9 31.75 14.66  8.93 28.4 77.66  12.2 43.59 39.6  7.81
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.00   0.0 40.00 80.0  0.00
## CV residual      28.6 -9.25  7.84 -8.93 51.6  2.34 -12.2 -3.59 40.4 -7.81
##                    210   216
## Predicted         7.86  7.98
## cvpred            7.63  7.75
## Survey_occupancy  0.00  0.00
## CV residual      -7.63 -7.75
##
## Sum of squares = 11073    Mean square = 503    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32    33   61    64    66    68    75    80   85
```

```
## Predicted         13.2 17.63 29.31 24.9 31.02  29.0  50.8  17.6  11.0 39.2
## cvpred            13.9 18.46 30.55 26.0 32.33  30.2  52.8  17.9  11.1 40.3
## Survey_occupancy   0.0 22.50 22.50 22.5 22.50   0.0  22.5   0.0   0.0 67.5
## CV residual      -13.9  4.04 -8.05 -3.5 -9.83 -30.2 -30.3 -17.9 -11.1 27.2
##                    102    127   132   156   159  163   171   192  195
## Predicted        39.51 21.621 17.81 32.17  86.4 48.0  31.2  50.7 55.1
## cvpred           40.59 22.069 18.12 32.47  88.6 48.9  31.5  51.6 56.2
## Survey_occupancy 45.00 22.500 22.50 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual       4.41  0.431  4.38  7.53 -48.6 31.1 -31.5 -11.6 23.8
##                    208   214
## Predicted         11.8  11.9
## cvpred            11.4  11.5
## Survey_occupancy   0.0   0.0
## CV residual      -11.4 -11.5
##
## Sum of squares = 8781    Mean square = 418    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63   72    73    93    99  104   109   111
## Predicted          9.92 15.85 11.0  8.33 20.29 20.97 40.3  15.0 28.07
## cvpred            10.37 16.18 11.4  8.68 20.41 21.08 40.0  15.2 28.03
## Survey_occupancy   0.00 22.50 22.5  0.00 22.50 22.50 45.0   0.0 22.50
## CV residual      -10.37  6.32 11.1 -8.68  2.09  1.42  5.0 -15.2 -5.53
##                    115   137   143   153   155  158  181  184   190   199
## Predicted        69.52  11.8  15.3  12.5  12.9 30.2 43.2 42.9  60.4 48.92
## cvpred           68.65  12.1  15.5  12.7  13.0 30.0 42.7 42.4  59.6 48.35
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual      -1.15 -12.1 -15.5 -12.7 -13.0 10.0 37.3 37.6 -19.6 -8.35
##                    200  212
## Predicted         8.96 17.0
## cvpred            9.18 17.1
## Survey_occupancy  0.00 40.0
## CV residual      -9.18 22.9
##
## Sum of squares = 5324    Mean square = 254    n = 21
##
## fold 7
## Observations in test set: 21
##                      15   20    23    38    41   46    51    52   81   100
## Predicted         22.4 11.1  11.8  23.0 28.14 38.1 36.23  16.8 22.1 20.24
## cvpred            22.7 11.2  11.9  23.2 28.45 38.5 36.62  17.0 22.3 20.42
## Survey_occupancy   0.0 22.5   0.0   0.0 22.50 67.5 45.00   0.0 45.0 22.50
## CV residual      -22.7 11.3 -11.9 -23.2 -5.95 29.0  8.38 -17.0 22.7  2.08
##                    105   110   119  124   129   150  157   164   170   177
## Predicted        25.7 70.16  22.7 35.8  12.3  52.0 49.8  50.3 43.01  70.1
## cvpred           25.9 70.82  22.9 36.1  12.4  52.4 50.2  50.7 43.35  70.7
## Survey_occupancy 45.0 67.50   0.0 45.0   0.0  40.0 80.0  40.0 40.00  40.0
## CV residual      19.1 -3.32 -22.9  8.9 -12.4 -12.4 29.8 -10.7 -3.35 -30.7
##                    204
## Predicted        45.44
## cvpred           45.81
## Survey_occupancy 40.00
## CV residual      -5.81
```

```
##
## Sum of squares = 6347    Mean square = 302    n = 21
##
## fold 8
## Observations in test set: 21
##                      14    24    26    44    50    65    71    84    87
## Predicted         16.68 20.65 27.05  10.8 14.37 17.21  40.8 29.19  15.7
## cvpred            16.73 20.64 26.95  10.9 14.45 17.25  40.5 29.14  15.8
## Survey_occupancy 22.50 22.50 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       5.77  1.86 -4.45 -10.9  8.05  5.25 -18.0 -6.64 -15.8
##                      88   97   114   116  121   126   131   151   165   167
## Predicted         11.9 19.5 13.41  24.3 43.4 38.44 25.81  24.2  52.9 32.24
## cvpred            12.1 19.6 13.58  24.4 43.2 38.26 25.81  24.3  52.6 32.22
## Survey_occupancy   0.0 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.00
## CV residual      -12.1 47.9  8.92 -24.4 24.3  6.74 -3.31 -24.3 -12.6  7.78
##                     173   211
## Predicted         51.2  8.87
## cvpred            50.9  9.18
## Survey_occupancy 80.0  0.00
## CV residual       29.1 -9.18
##
## Sum of squares = 6390    Mean square = 304    n = 21
##
## fold 9
## Observations in test set: 21
##                      10   25   28    31    36    37    39    56    59    96
## Predicted         25.9 12.9 15.2 15.14  16.1  15.3 14.84  9.06 15.91 47.10
## cvpred            25.3 12.5 14.8 14.71  15.6  14.8 14.42  8.75 15.46 46.77
## Survey_occupancy 45.0 22.5 45.0 22.50   0.0   0.0 22.50  0.00 22.50 45.00
## CV residual       19.7 10.0 30.2  7.79 -15.6 -14.8  8.08 -8.75  7.04 -1.77
##                     101   113   117   123  144   148  152   154   178   198
## Predicted         63.33 26.41  18.8 23.95 18.0  15.6 60.1 76.80  50.8 81.84
## cvpred            62.69 26.49  19.1 24.08 18.3  16.7 60.3 76.62  51.1 81.57
## Survey_occupancy 67.50 22.50   0.0 22.50 22.5   0.0 80.0 80.00  40.0 80.00
## CV residual       4.81 -3.99 -19.1 -1.58  4.2 -16.7 19.7  3.38 -11.1 -1.57
##                     205
## Predicted          32.9
## cvpred             33.6
## Survey_occupancy    0.0
## CV residual       -33.6
##
## Sum of squares = 4479    Mean square = 213    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8   21    22    35    43   49   77    78    83
## Predicted          6.84  9.26 28.2 17.57 15.72 18.49 26.1 26.4  8.43 16.57
## cvpred             6.26  8.81 28.8 17.56 15.62 18.53 26.5 26.0  7.05 15.61
## Survey_occupancy   0.00  0.00 22.5 22.50 22.50 22.50 22.5 45.0  0.00 22.50
## CV residual       -6.26 -8.81 -6.3  4.94  6.88  3.97 -4.0 19.0 -7.05  6.89
##                      90    94   112   138  142  149   162   169   179  185
## Predicted         26.7 24.33  18.9  13.1 20.0 26.0  46.5 44.53 44.53 12.8
## cvpred            26.2 23.79  18.1  11.9 19.2 24.7  46.2 44.17 44.17 10.7
## Survey_occupancy 45.0 22.50   0.0   0.0 45.0 40.0   0.0 40.00 40.00 40.0
```

```
## CV residual      18.8 -1.29 -18.1 -11.9 25.8 15.3 -46.2 -4.17 -4.17 29.3
##                    207
## Predicted        11.30
## cvpred            9.17
## Survey_occupancy 80.00
## CV residual      70.83
##
## Sum of squares = 10484    Mean square = 499    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 316

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  59964   59964  190.76 <2e-16 ***
## Factor_Time          3    347     116    0.37   0.78
## Residuals          208  65382     314
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                       6    11   12   19     30    34    48   54    76    89
## Predicted          7.31 15.94 29.6 28.8 23.105  34.7 29.67 19.6 23.93  9.37
## cvpred             7.69 16.06 29.3 29.0 23.497  34.8 29.82 20.0 23.81  9.68
## Survey_occupancy   0.00 22.50 45.0 45.0 22.500  22.5 22.50 22.5 22.50  0.00
```

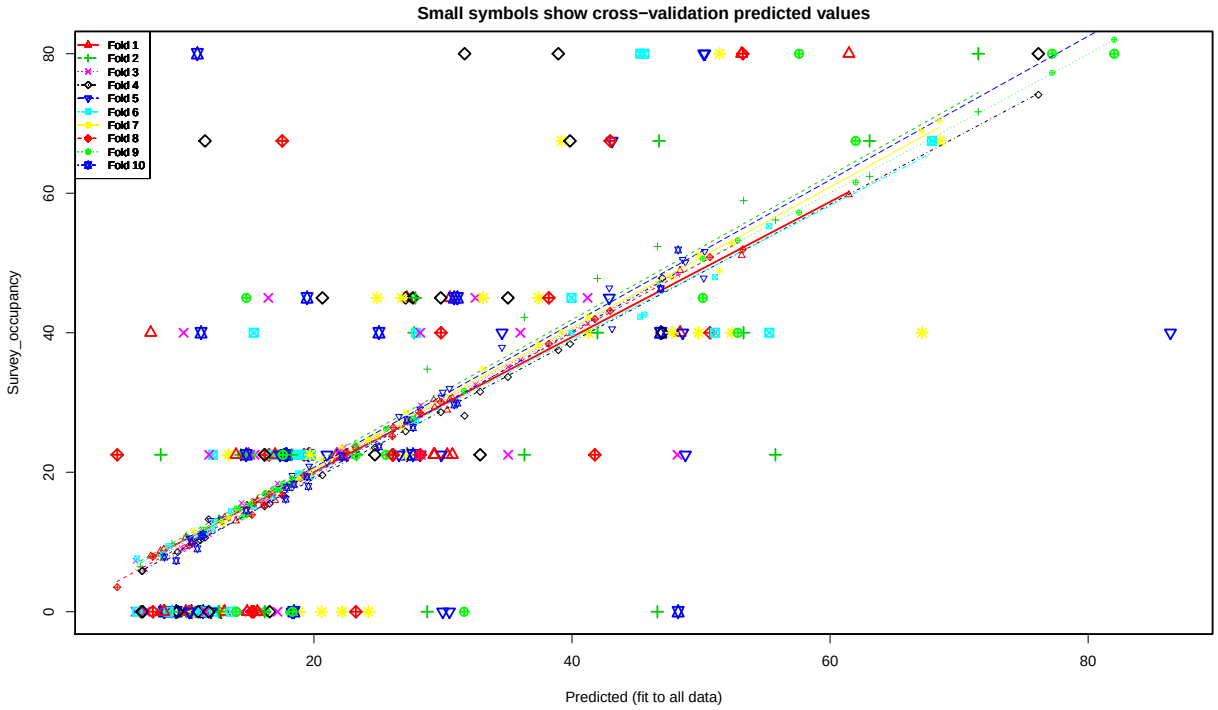
```
## CV residual      -7.69  6.44 15.7 16.0 -0.997 -12.3 -7.32  2.5 -1.31 -9.68
##                    120  122   134   136   168  188   196   202  203   206
## Predicted        19.40 31.1 14.14  11.7 46.55 59.4  15.6  13.2 55.1  5.73
## cvpred           19.86 31.2 13.59  11.2 46.24 58.7  16.2  12.7 53.3  5.44
## Survey_occupancy 22.50 22.5 22.50   0.0 40.00 80.0   0.0   0.0 80.0 40.00
## CV residual       2.64 -8.7  8.91 -11.2 -6.24 21.3 -16.2 -12.7 26.7 34.56
##                    213
## Predicted         6.80
## cvpred            6.47
## Survey_occupancy  0.00
## CV residual      -6.47
##
## Sum of squares = 4064    Mean square = 194    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17    18    42    47    74    86   91    106
## Predicted          9.43 26.18  12.1 15.14 23.34  7.18 31.27 45.4 66.260
## cvpred            10.14 27.01  12.8 15.49 23.75  7.88 32.13 45.9 66.915
## Survey_occupancy   0.00 22.50   0.0 22.50 22.50  0.00 22.50 67.5 67.500
## CV residual      -10.14 -4.51 -12.8  7.01 -1.25 -7.88 -9.63 21.6  0.585
##                    107  118   125   133  146   160    174   176   182
## Predicted         54.8 29.3 20.74  8.04 26.7  8.24 39.858  51.7  17.1
## cvpred            55.4 29.7 21.13  8.47 27.5  8.95 40.329  52.3  17.4
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0  0.00 40.000  40.0   0.0
## CV residual      -32.9 15.3  1.37 14.03 12.5 -8.95 -0.329 -12.3 -17.4
##                    183   189   191   215
## Predicted        69.87  24.7  13.3  41.3
## cvpred           70.61  25.1  13.7  41.9
## Survey_occupancy 80.00   0.0   0.0   0.0
## CV residual       9.39 -25.1 -13.7 -41.9
##
## Sum of squares = 5826    Mean square = 265    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     7    27    40    55    57    62    69
## Predicted          9.07 15.26 13.77  17.1 14.72  33.5 39.95  47.2 29.12
## cvpred             8.85 15.13 13.62  16.6 14.47  34.3 40.86  48.3 29.85
## Survey_occupancy   0.00 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.50
## CV residual       -8.85  7.37  8.88 -16.6  8.03 -11.8  4.14 -25.8 -7.35
##                     79    92   95   98   103   108   128  139  166  175
## Predicted          6.80  21.0 34.3 13.9 25.95 26.36  14.6 15.3 29.9 11.9
## cvpred             6.53  20.4 34.0 13.3 25.52 25.94  15.1 15.8 29.5 11.2
## Survey_occupancy   0.00   0.0 45.0 22.5 22.50 22.50   0.0 45.0 40.0 40.0
## CV residual       -6.53 -20.4 11.0  9.2 -3.02 -3.44 -15.1 29.2 10.5 28.8
##                    187   194   209
## Predicted         12.3 36.60  5.29
## cvpred            12.0 36.71  5.64
## Survey_occupancy   0.0 40.00  0.00
## CV residual      -12.0  3.29 -5.64
##
## Sum of squares = 4320    Mean square = 196    n = 22
##
```

```
## fold 4
## Observations in test set: 22
##                       3     5   29    45   53   58   60   67    70    82
## Predicted         10.55 16.16 31.9  16.3 27.3 29.2 33.5 19.6 22.72 10.93
## cvpred             8.69 14.14 32.0  15.9 26.6 27.6 31.8 18.3 21.31  9.06
## Survey_occupancy  0.00 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.50
## CV residual      -8.69  8.36 13.0 -15.9 18.4 17.4 13.2 26.7  1.19 58.44
##                    130  135   140   141  161   172   180   186  197   201
## Predicted         38.5 31.2 13.78  7.92 27.0 79.93  13.0 43.75 39.7  5.08
## cvpred            36.7 29.6 12.62  6.92 24.6 78.64  13.6 42.61 38.7  4.16
## Survey_occupancy 67.5 22.5 22.50  0.00 80.0 80.00   0.0 40.00 80.0  0.00
## CV residual       30.8 -7.1  9.88 -6.92 55.4  1.36 -13.6 -2.61 41.3 -4.16
##                     210   216
## Predicted          4.90  5.02
## cvpred             3.99  4.11
## Survey_occupancy   0.00  0.00
## CV residual       -3.99 -4.11
##
## Sum of squares = 11676    Mean square = 531    n = 22
##
## fold 5
## Observations in test set: 21
##                       16    32    33    61    64    66    68    75    80
## Predicted          13.8 20.86  32.5 24.68  30.8  28.8  50.5  16.8  10.2
## cvpred             14.4 20.39  32.6 26.54  32.9  30.8  53.5  17.7  10.8
## Survey_occupancy    0.0 22.50  22.5 22.50  22.5   0.0  22.5   0.0   0.0
## CV residual       -14.4  2.11 -10.1 -4.04 -10.4 -30.8 -31.0 -17.7 -10.8
##                     85   102    127   132   156   159  163   171   192  195
## Predicted         38.4 41.34 20.016 16.21 29.98  84.1 48.5  31.7  49.8 54.2
## cvpred            40.1 41.75 21.676 17.71 31.38  87.9 49.2  31.7  50.3 54.9
## Survey_occupancy 67.5 45.00 22.500 22.50 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual       27.4  3.25  0.824  4.79  8.62 -47.9 30.8 -31.7 -10.3 25.1
##                     208    214
## Predicted          8.87   8.93
## cvpred            10.05  10.11
## Survey_occupancy   0.00   0.00
## CV residual      -10.05 -10.11
##
## Sum of squares = 8816    Mean square = 420    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63   72    73     93     99  104   109   111
## Predicted          10.5 15.62 10.8  7.53 22.146 22.830 42.1  15.5 28.55
## cvpred             11.3 15.54 10.8  8.40 22.319 22.991 41.9  15.1 27.88
## Survey_occupancy    0.0 22.50 22.5  0.00 22.500 22.500 45.0   0.0 22.50
## CV residual       -11.3  6.96 11.7 -8.40  0.181 -0.491  3.1 -15.1 -5.38
##                     115   137   143   153   155  158  181 184   190   199
## Predicted         69.94  10.2  13.7  10.4  10.7 28.0 42.3  42  59.4 45.91
## cvpred            68.49  10.2  13.7  11.2  11.5 28.5 41.4  41  58.2 45.26
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0  80  40.0 40.00
## CV residual       -0.99 -10.2 -13.7 -11.2 -11.5 11.5 38.6  39 -18.2 -5.26
##                    200  212
## Predicted          6.0 14.1
```

```
## cvpred            6.1 14.0
## Survey_occupancy  0.0 40.0
## CV residual      -6.1 26.0
##
## Sum of squares = 5417    Mean square = 258    n = 21
##
## fold 7
## Observations in test set: 21
##                      15    20    23    38    41   46    51    52   81
## Predicted         23.0 14.31  15.0  24.8 29.99 39.9 38.07  18.7 21.3
## cvpred            22.5 15.04  15.7  25.6 30.75 40.7 38.82  19.4 20.8
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0
## CV residual      -22.5  7.46 -15.7 -25.6 -8.25 26.8  6.18 -19.4 24.2
##                     100  105   110   119  124   129   150  157   164   170
## Predicted        22.098 27.5 70.58  23.2 36.2  10.7 49.74 47.6  50.7 43.47
## cvpred           22.824 28.3 71.31  23.9 37.0  11.0 49.23 47.1  51.4 44.18
## Survey_occupancy 22.500 45.0 67.50   0.0 45.0   0.0 40.00 80.0  40.0 40.00
## CV residual      -0.324 16.7 -3.81 -23.9  8.0 -11.0 -9.23 32.9 -11.4 -4.18
##                    177   204
## Predicted         70.5 42.44
## cvpred            71.2 42.67
## Survey_occupancy  40.0 40.00
## CV residual      -31.2 -2.67
##
## Sum of squares = 6597    Mean square = 314    n = 21
##
## fold 8
## Observations in test set: 21
##                      14     24    26    44    50    65    71    84    87
## Predicted        17.24 23.874 30.27  12.7 16.24 16.98  40.5 28.37  14.9
## cvpred           18.28 22.653 29.04  12.6 16.11 17.39  40.9 29.39  15.9
## Survey_occupancy 22.50 22.500 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       4.22 -0.153 -6.54 -12.6  6.39  5.11 -18.4 -6.89 -15.9
##                     88   97   114   116  121   126  131 151   165   167
## Predicted          11.1 21.3 13.91  24.8 43.9 38.91 24.2  22  53.3 32.71
## cvpred             12.2 20.1 13.79  24.7 43.7 38.75 24.6  23  52.1 31.48
## Survey_occupancy   0.0 67.5 22.50   0.0 67.5 45.00 22.5   0  40.0 40.00
## CV residual      -12.2 47.4  8.71 -24.7 23.8  6.25 -2.1 -23 -12.1  8.52
##                    173   211
## Predicted        51.6  5.91
## cvpred           50.4  6.33
## Survey_occupancy 80.0  0.00
## CV residual      29.6 -6.33
##
## Sum of squares = 6278    Mean square = 299    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        26.5 16.11 18.4 18.37  19.3  17.1 16.71  8.84 15.68 48.92
## cvpred           25.7 16.42 18.7 18.62  19.5  18.2 17.84  9.63 16.31 48.47
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50  0.00 22.50 45.00
## CV residual      19.3  6.08 26.3  3.88 -19.5 -18.2  4.66 -9.63  6.19 -3.47
##                    101   113   117   123   144   148  152   154   178
```

```
## Predicted        65.13 26.89  19.3 24.44 16.45  13.5 57.9 74.54  51.2
## cvpred           64.32 27.79  20.4 25.39 17.06  12.9 56.3 72.63  50.7
## Survey_occupancy 67.50 22.50   0.0 22.50 22.50   0.0 80.0 80.00  40.0
## CV residual       3.18 -5.29 -20.4 -2.89  5.44 -12.9 23.7  7.37 -10.7
##                    198   205
## Predicted        80.883  29.9
## cvpred           80.552  30.3
## Survey_occupancy 80.000   0.0
## CV residual      -0.552 -30.3
##
## Sum of squares = 4302    Mean square = 205    n = 21
##
## fold 10
## Observations in test set: 21
##                      4     8    21    22    35    43    49   77    78   83
## Predicted         7.42  9.83 31.45 20.80 18.96 20.36 27.91 25.6  7.64 15.8
## cvpred            7.05  9.55 31.71 20.66 18.76 19.84 27.66 25.9  7.28 15.7
## Survey_occupancy  0.00  0.00 22.50 22.50 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual      -7.05 -9.55 -9.21  1.84  3.74  2.66 -5.16 19.1 -7.28  6.8
##                    90    94   112   138  142  149   162   169   179  185
## Predicted        25.8 26.18  19.4 11.47 18.4 23.8  44.3 44.98 44.98 11.9
## cvpred           26.1 26.25  18.9  9.43 16.6 24.1  45.2 45.72 45.72 11.1
## Survey_occupancy 45.0 22.50   0.0  0.00 45.0 40.0   0.0 40.00 40.00 40.0
## CV residual      18.9 -3.75 -18.9 -9.43 28.4 15.9 -45.2 -5.72 -5.72 28.9
##                    207
## Predicted         8.34
## cvpred            6.18
## Survey_occupancy 80.00
## CV residual      73.82
##
## Sum of squares = 11012    Mean square = 524    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 321


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                    Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs   1  59964   59964  190.88 <2e-16 ***
## Course_Level        5   1016     203    0.65   0.66
## Residuals         206  64713     314
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19     30    34    48    54    76
## Predicted           8.10 14.92 30.5 27.2 21.781 30.32 29.36 19.69 29.29
## cvpred              8.71 13.94 30.5 27.2 21.959 28.91 29.33 19.92 30.38
## Survey_occupancy    0.00 22.50 45.0 45.0 22.500 22.50 22.50 22.50 22.50
## CV residual        -8.71  8.56 14.5 17.8  0.541 -6.41 -6.83  2.58 -7.88
##                       89   120   122   134   136   168  188   196   202  203
## Predicted           10.1 16.99 30.73 13.96  13.1 48.37 61.5  14.8  15.6 53.1
## cvpred              10.6 15.95 30.65 13.01  13.5 48.92 59.8  15.2  16.0 51.1
## Survey_occupancy     0.0 22.50 22.50 22.50   0.0 40.00 80.0   0.0   0.0 80.0
## CV residual        -10.6  6.55 -8.15  9.49 -13.5 -8.92 20.2 -15.2 -16.0 28.9
##                       206   213
## Predicted            7.35  8.37
## cvpred               7.98  8.97
## Survey_occupancy    40.00  0.00
## CV residual         32.02 -8.97
##
## Sum of squares = 4247    Mean square = 202    n = 21
##
## fold 2
## Observations in test set: 22
##                        13    17    18    42     47    74    86   91   106
## Predicted           10.1 27.27  12.7 14.34 23.310  6.55  36.3 46.7 63.06
## cvpred              10.9 27.15  13.4 15.02 23.247  6.46  42.2 47.3 62.42
## Survey_occupancy     0.0 22.50   0.0 22.50 22.500  0.00  22.5 67.5 67.50
## CV residual        -10.9 -4.65 -13.4  7.48 -0.747 -6.46 -19.7 20.2  5.08
##                       107  118  125   133  146   160   174   176   182   183
## Predicted            55.8 27.9 18.3  8.13 27.8  8.99 41.97  53.3  16.2 71.49
```

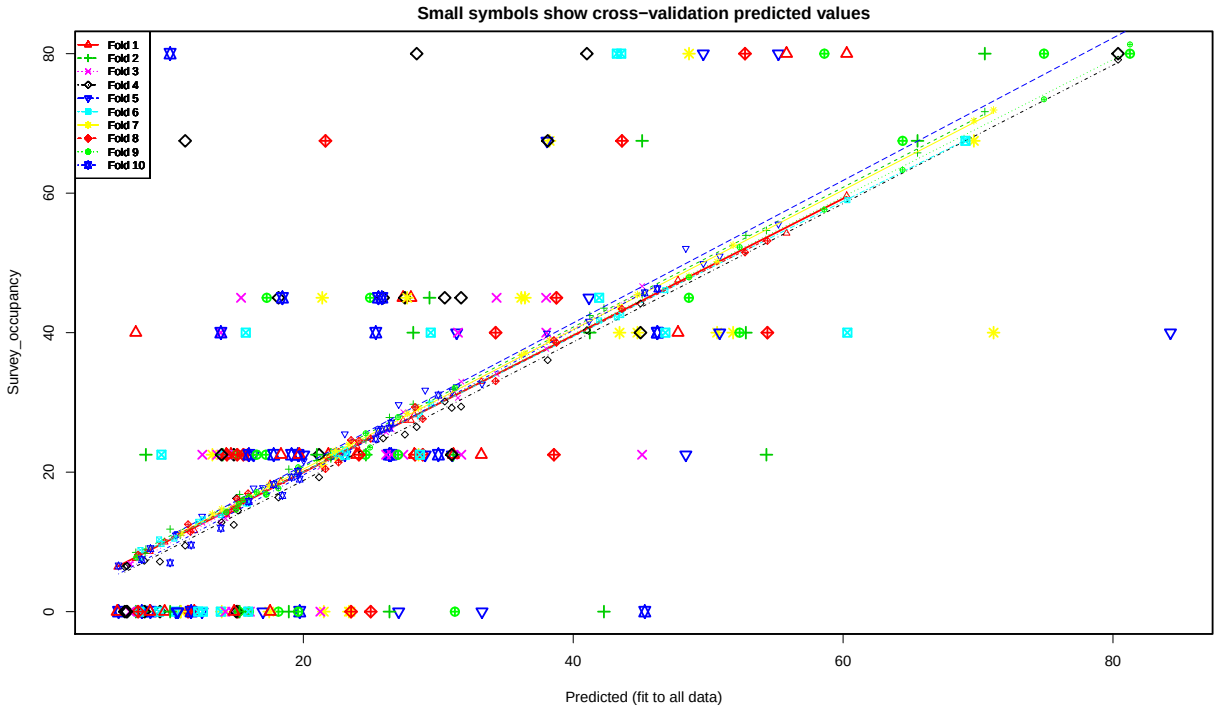
```
## cvpred            56.2 28.4 18.0  8.01 27.6  9.75 47.78  58.9  16.8 71.67
## Survey_occupancy  22.5 45.0 22.5 22.50 40.0  0.00 40.00  40.0   0.0 80.00
## CV residual      -33.7 16.6  4.5 14.49 12.4 -9.75 -7.78 -18.9 -16.8  8.33
##                    189   191   215
## Predicted         28.8  12.6  46.6
## cvpred            34.8  13.3  52.4
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -34.8 -13.3 -52.4
##
## Sum of squares = 8030    Mean square = 365    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     7    27    40    55    57    62    69
## Predicted         9.78 16.82 15.40  16.1 15.06  35.0 41.20  48.2 28.29
## cvpred            8.97 16.75 15.31  16.0 14.97  35.1 41.32  48.3 29.59
## Survey_occupancy  0.00 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.50
## CV residual      -8.97  5.75  7.19 -16.0  7.53 -12.6  3.68 -25.8 -7.09
##                     79    92   95   98    103  108   128  139  166   175
## Predicted         6.18  17.2 32.5 11.9 21.944 22.3  14.4 16.5 28.2  9.90
## cvpred            7.30  18.4 32.6 11.1 23.198 23.6  15.6 15.7 28.3  9.08
## Survey_occupancy  0.00   0.0 45.0 22.5 22.500 22.5   0.0 45.0 40.0 40.00
## CV residual      -7.30 -18.4 12.4 11.4 -0.698 -1.1 -15.6 29.3 11.7 30.92
##                    187   194   209
## Predicted         11.6 35.99  6.93
## cvpred            10.8 36.07  6.09
## Survey_occupancy   0.0 40.00  0.00
## CV residual      -10.8  3.93 -6.09
##
## Sum of squares = 4411    Mean square = 200    n = 22
##
## fold 4
## Observations in test set: 22
##                      3     5   29    45   53   58   60   67    70   82
## Predicted         11.2 17.69 27.7  16.6 27.1 29.8 35.0 20.7 24.73 11.6
## cvpred            10.3 16.59 27.1  15.5 25.9 28.6 33.7 19.6 23.52 10.6
## Survey_occupancy   0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.5
## CV residual      -10.3  5.91 17.9 -15.5 19.1 16.4 11.3 25.4 -1.02 56.9
##                    130   135   140   141  161   172   180   186  197   201
## Predicted        39.8 32.88 16.17  9.44 31.7 76.14  11.0 47.00 38.9  6.73
## cvpred           38.4 31.54 15.11  8.54 28.1 74.11  10.1 47.84 37.5  5.87
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.00   0.0 40.00 80.0  0.00
## CV residual      29.1 -9.04  7.39 -8.54 51.9  5.89 -10.1 -7.84 42.5 -5.87
##                    210   216
## Predicted         11.8  6.67
## cvpred            13.2  5.81
## Survey_occupancy   0.0  0.00
## CV residual      -13.2 -5.81
##
## Sum of squares = 11344    Mean square = 516    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32    33   61    64    66    68    75    80   85
```

```
## Predicted         12.8 19.63 28.23 26.6 29.87  30.5  48.8  18.3  12.0 43.1
## cvpred            13.3 20.87 29.07 28.0 30.75  32.0  50.1  19.5  13.1 40.6
## Survey_occupancy   0.0 22.50 22.50 22.5 22.50   0.0  22.5   0.0   0.0 67.5
## CV residual      -13.3  1.63 -6.57 -5.5 -8.25 -32.0 -27.6 -19.5 -13.1 26.9
##                    102   127   132   156   159  163   171   192  195   208
## Predicted        42.89 21.01 17.37 34.57  86.4 50.2  30.0  48.6 50.3  10.3
## cvpred           46.42 21.42 17.69 37.91  91.0 47.8  31.5  50.5 51.6  10.5
## Survey_occupancy 45.00 22.50 22.50 40.00  40.0 80.0   0.0  40.0 80.0   0.0
## CV residual      -1.42  1.08  4.81  2.09 -51.0 32.2 -31.5 -10.5 28.4 -10.5
##                    214
## Predicted         10.4
## cvpred            10.6
## Survey_occupancy   0.0
## CV residual      -10.6
##
## Sum of squares = 9173    Mean square = 437    n = 21
##
## fold 6
## Observations in test set: 21
##                      9   63   72    73    93   99   104   109   111    115
## Predicted         12.3 16.8 12.2  8.31 19.74 19.0 39.96  6.30 18.76 67.888
## cvpred            12.9 16.5 12.0  8.18 19.37 19.7 39.99  7.65 19.85 67.333
## Survey_occupancy   0.0 22.5 22.5  0.00 22.50 22.5 45.00  0.00 22.50 67.500
## CV residual      -12.9  6.0 10.5 -8.18  3.13  2.8  5.01 -7.65  2.65  0.167
##                    137   143   153   155  158  181  184   190   199   200
## Predicted         11.6  13.6  11.0  11.4 27.9 45.6 45.3  55.3 51.08  8.73
## cvpred            11.4  14.4  10.8  11.2 27.4 42.6 42.3  55.3 47.97  9.41
## Survey_occupancy   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00  0.00
## CV residual      -11.4 -14.4 -10.8 -11.2 12.6 37.4 37.7 -15.3 -7.97 -9.41
##                    212
## Predicted        15.3
## cvpred           15.1
## Survey_occupancy 40.0
## CV residual      24.9
##
## Sum of squares = 5056    Mean square = 241    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20    23    38    41   46    51    52   81   100
## Predicted         24.2 13.36  12.9  22.2 27.12 39.2 37.40  18.8 26.8 19.69
## cvpred            24.6 13.42  12.7  23.5 28.61 40.1 38.25  19.1 26.4 19.69
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0 22.50
## CV residual      -24.6  9.08 -12.7 -23.5 -6.11 27.4  6.75 -19.1 18.6  2.81
##                    105   110   119  124   129   150  157   164   170   177
## Predicted        24.9 68.50  20.6 33.1  10.7  49.8 51.4  52.4 41.26  67.1
## cvpred           25.1 70.39  21.9 34.8  11.6  51.1 48.9  52.8 42.25  68.9
## Survey_occupancy 45.0 67.50   0.0 45.0   0.0  40.0 80.0  40.0 40.00  40.0
## CV residual      19.9 -2.89 -21.9 10.2 -11.6 -11.1 31.1 -12.8 -2.25 -28.9
##                    204
## Predicted        47.75
## cvpred           48.03
## Survey_occupancy 40.00
## CV residual      -8.03
```

```
##
## Sum of squares = 6242    Mean square = 297    n = 21
##
## fold 8
## Observations in test set: 21
##                      14     24    26    44    50    65    71    84    87
## Predicted        16.2 22.517 26.08 10.56 16.51 19.23  41.8 28.24  15.3
## cvpred           15.3 22.811 25.15  9.72 16.84 19.55  42.0 28.49  15.7
## Survey_occupancy 22.5 22.500 22.50  0.00 22.50 22.50  22.5 22.50   0.0
## CV residual       7.2 -0.311 -2.65 -9.72  5.66  2.95 -19.5 -5.99 -15.7
##                     88   97   114   116  121   126   131   151   165   167
## Predicted        10.3 17.5  4.75  15.2 43.0 38.20 26.14  23.2  50.7 29.85
## cvpred            9.5 16.7  3.52  13.9 43.1 38.41 26.41  23.5  50.8 30.09
## Survey_occupancy  0.0 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.00
## CV residual      -9.5 50.8 18.98 -13.9 24.4  6.59 -3.91 -23.5 -10.8  9.91
##                     173   211
## Predicted        53.2  7.52
## cvpred           52.0  7.89
## Survey_occupancy 80.0  0.00
## CV residual      28.0 -7.89
##
## Sum of squares = 6353    Mean square = 303    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        27.6 15.09 14.8 17.25  18.2  16.2 14.41  11.4 16.86 50.14
## cvpred           27.7 15.37 13.9 17.49  18.4  17.0 13.52  11.8 17.63 50.62
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.00
## CV residual      17.3  7.13 31.1  5.01 -18.4 -17.0  8.98 -11.8  4.87 -5.62
##                     101   113   117  123   144   148  152   154   178   198
## Predicted        61.98 25.58  18.3 23.2 17.60  14.0 57.6 77.20  52.8 82.02
## cvpred           61.55 26.22  19.1 23.9 18.35  14.8 57.2 77.27  53.3 82.02
## Survey_occupancy 67.50 22.50   0.0 22.5 22.50   0.0 80.0 80.00  40.0 80.00
## CV residual       5.95 -3.72 -19.1 -1.4  4.15 -14.8 22.8  2.73 -13.3 -2.02
##                     205
## Predicted          31.6
## cvpred             31.7
## Survey_occupancy    0.0
## CV residual      -31.7
##
## Sum of squares = 4608    Mean square = 219    n = 21
##
## fold 10
## Observations in test set: 21
##                        4     8   21    22    35    43   49   77    78    83
## Predicted         9.32  10.5 27.2 19.57 17.81 17.90 27.7 30.9  8.41 14.75
## cvpred            7.31  10.0 27.5 17.97 16.14 17.82 26.4 29.6  7.84 14.55
## Survey_occupancy  0.00   0.0 22.5 22.50 22.50 22.50 22.5 45.0  0.00 22.50
## CV residual      -7.31 -10.0 -5.0  4.53  6.36  4.68 -3.9 15.4 -7.84  7.95
##                     90     94   112   138  142  149   162   169   179  185
## Predicted        31.1 22.170  18.4  11.4 19.5 25.0  48.2 46.87 46.87 11.3
## cvpred           29.9 22.262  18.3  11.1 19.3 23.7  51.9 46.29 46.29 10.8
## Survey_occupancy 45.0 22.500   0.0   0.0 45.0 40.0   0.0 40.00 40.00 40.0
```

```
## CV residual      15.1  0.238 -18.3 -11.1 25.7 16.3 -51.9 -6.29 -6.29 29.2
##                    207
## Predicted        10.96
## cvpred            9.02
## Survey_occupancy 80.00
## CV residual      70.98
##
## Sum of squares = 10908    Mean square = 519    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 330

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  59964   59964  190.70 <2e-16 ***
## Room                 1    242     242    0.77   0.38
## Factor_Time          3    395     132    0.42   0.74
## Residuals          207  65091     314
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      6    11    12    19     30    34    48    54    76
## Predicted         6.21 14.63 28.0 27.4 21.853  33.2 28.22 18.34 23.95
## cvpred            6.38 14.53 27.4 27.4 22.052  33.0 28.23 18.67 23.74
```

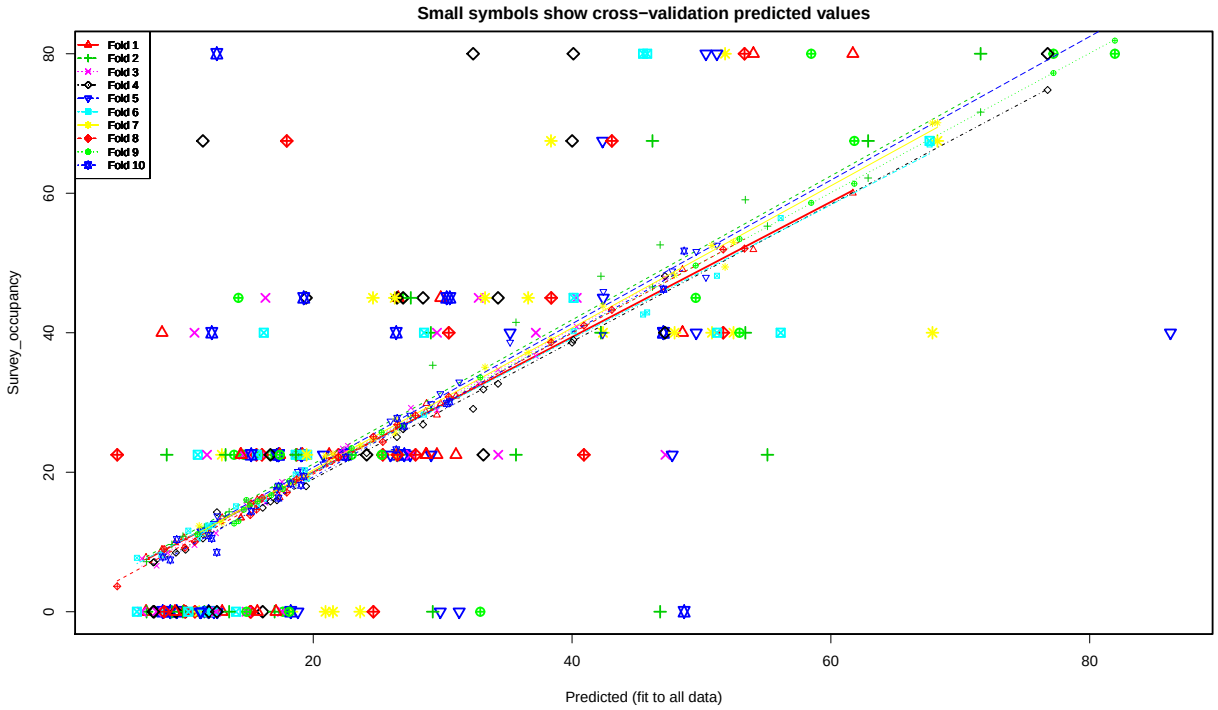
```
## Survey_occupancy  0.00 22.50 45.0 45.0 22.500  22.5 22.50 22.50 22.50
## CV residual      -6.38  7.97 17.6 17.6  0.448 -10.5 -5.73  3.83 -1.24
##                     89   120   122  134   136   168  188   196   202  203
## Predicted         9.72 19.70 31.12 14.3  11.9 47.76 60.3  17.5  14.9 55.8
## cvpred            9.98 20.19 31.24 13.9  11.6 47.52 59.6  18.3  14.7 54.3
## Survey_occupancy  0.00 22.50 22.50 22.5   0.0 40.00 80.0   0.0   0.0 80.0
## CV residual      -9.98  2.31 -8.74  8.6 -11.6 -7.52 20.4 -18.3 -14.7 25.7
##                    206   213
## Predicted         7.58  8.62
## cvpred            7.62  8.63
## Survey_occupancy 40.00  0.00
## CV residual      32.38 -8.63
##
## Sum of squares = 4079    Mean square = 194    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17    18    42     47    74    86   91   106
## Predicted         8.27 24.64  10.9 14.03 22.041  7.59 31.12 45.1 65.51
## cvpred            8.36 24.63  10.9 13.94 21.897  8.49 31.88 45.5 65.78
## Survey_occupancy  0.00 22.50   0.0 22.50 22.500  0.00 22.50 67.5 67.50
## CV residual      -8.36 -2.13 -10.9  8.56  0.603 -8.49 -9.38 22.0  1.72
##                    107  118    125   133  146   160   174   176   182
## Predicted         54.3 29.3 21.002  8.33 28.1  10.1 41.23  52.8  18.9
## cvpred            54.7 30.0 21.677  8.96 29.7  11.8 42.46  54.0  20.4
## Survey_occupancy  22.5 45.0 22.500 22.50 40.0   0.0 40.00  40.0   0.0
## CV residual      -32.2 15.0  0.823 13.54 10.3 -11.8 -2.46 -14.0 -20.4
##                    183   189   191   215
## Predicted        70.50  26.4  15.3  42.3
## cvpred           71.69  27.8  16.8  43.5
## Survey_occupancy 80.00   0.0   0.0   0.0
## CV residual       8.31 -27.8 -16.8 -43.5
##
## Sum of squares = 6241    Mean square = 284    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     7    27   40    55   57    62    69    79
## Predicted         7.93 13.97 12.51  16.0 13.6  31.7 38.0  45.1 27.41  7.21
## cvpred            8.06 14.23 12.75  15.9 13.8  33.0 39.4  46.7 28.59  6.81
## Survey_occupancy  0.00 22.50 22.50   0.0 22.5  22.5 45.0  22.5 22.50  0.00
## CV residual      -8.06  8.27  9.75 -15.9  8.7 -10.5  5.6 -24.2 -6.09 -6.81
##                     92   95    98   103   108   128  139   166  175   187
## Predicted         21.3 34.3 14.40 26.13 26.54  14.7 15.4 31.46 13.9  14.2
## cvpred            20.8 34.1 13.74 25.73 26.14  15.1 15.8 30.65 12.7  13.4
## Survey_occupancy   0.0 45.0 22.50 22.50 22.50   0.0 45.0 40.00 40.0   0.0
## CV residual      -20.8 10.9  8.76 -3.23 -3.64 -15.1 29.2  9.35 27.3 -13.4
##                    194   209
## Predicted        38.01  7.15
## cvpred           37.67  6.86
## Survey_occupancy 40.00  0.00
## CV residual       2.33 -6.86
##
## Sum of squares = 4163    Mean square = 189    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3    5   29    45   53   58   60   67    70    82
## Predicted          9.37 14.8 30.5  15.2 25.9 27.5 31.7 18.2 21.17 11.24
## cvpred             7.17 12.4 30.1  14.5 24.8 25.4 29.4 16.4 19.26  9.47
## Survey_occupancy   0.00 22.5 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.50
## CV residual       -7.17 10.1 14.9 -14.5 20.2 19.6 15.6 28.6  3.24 58.03
##                     130   135  140   141  161    172   180   186  197   201
## Predicted         38.1 31.00 13.9  8.21 28.4 80.378  15.0 44.99 41.0  6.94
## cvpred            36.1 29.22 12.8  7.30 26.5 79.132  16.3 44.18 40.4  6.57
## Survey_occupancy 67.5 22.50 22.5  0.00 80.0 80.000   0.0 40.00 80.0  0.00
## CV residual       31.4 -6.72  9.7 -7.30 53.5  0.868 -16.3 -4.18 39.6 -6.57
##                     210   216
## Predicted          6.77  6.89
## cvpred             6.40  6.51
## Survey_occupancy   0.00  0.00
## CV residual       -6.40 -6.51
##
## Sum of squares = 11843    Mean square = 538    n = 22
##
## fold 5
## Observations in test set: 21
##                       16    32    33    61    64    66    68    75    80
## Predicted          12.5 19.66 31.05 23.07 29.03  27.1  48.3  17.0  10.6
## cvpred             13.7 19.65 31.64 25.49 31.75  29.7  52.1  17.8  11.0
## Survey_occupancy    0.0 22.50 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual       -13.7  2.85 -9.14 -2.99 -9.25 -29.7 -29.6 -17.8 -11.0
##                      85   102    127   132   156   159  163   171   192  195
## Predicted         38.1 41.17 20.027 16.31 31.36  84.3 49.6  33.2  50.9 55.2
## cvpred            39.9 41.64 21.634 17.72 32.24  87.9 49.9  32.7  51.0 55.6
## Survey_occupancy 67.5 45.00 22.500 22.50 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual       27.6  3.36  0.866  4.78  7.76 -47.9 30.1 -32.7 -11.0 24.4
##                     208   214
## Predicted          10.6  10.7
## cvpred             11.1  11.2
## Survey_occupancy    0.0   0.0
## CV residual       -11.1 -11.2
##
## Sum of squares = 8654    Mean square = 412    n = 21
##
## fold 6
## Observations in test set: 21
##                        9    63    72    73      93     99   104   109   111
## Predicted           9.31 14.23  9.48  7.93 22.4222 23.091 41.92  15.9 28.64
## cvpred             10.36 14.36  9.70  8.83 22.5719 23.229 41.74  15.5 28.01
## Survey_occupancy    0.00 22.50 22.50  0.00 22.5000 22.500 45.00   0.0 22.50
## CV residual       -10.36  8.14 12.80 -8.83 -0.0719 -0.729  3.26 -15.5 -5.51
##                      115   137   143   153   155  158  181  184   190   199
## Predicted         69.067  10.4  13.9  12.2  12.6 29.4 43.6 43.2  60.3 46.83
## cvpred            67.764  10.5  13.9  12.9  13.2 29.8 42.5 42.2  59.0 46.09
## Survey_occupancy 67.500   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual       -0.264 -10.5 -13.9 -12.9 -13.2 10.2 37.5 37.8 -19.0 -6.09
##                     200  212
```

```
## Predicted         7.84 15.7
## cvpred            7.76 15.5
## Survey_occupancy  0.00 40.0
## CV residual      -7.76 24.5
##
## Sum of squares = 5334    Mean square = 254    n = 21
##
## fold 7
## Observations in test set: 21
##                      15    20    23    38    41   46   51    52   81    100
## Predicted         21.5 13.26  14.0  23.5 28.54 38.3 36.4  17.5 21.4 22.376
## cvpred            21.1 14.02  14.7  24.1 29.19 38.9 37.1  18.1 20.9 23.088
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.0   0.0 45.0 22.500
## CV residual      -21.1  8.48 -14.7 -24.1 -6.69 28.6  7.9 -18.1 24.1 -0.588
##                    105   110   119   124   129   150  157   164   170   177
## Predicted        27.7 69.69  23.4 36.15  10.9  50.7 48.6  51.8 44.76  71.2
## cvpred           28.4 70.38  23.9 36.75  11.2  50.2 48.1  52.6 45.45  71.9
## Survey_occupancy 45.0 67.50   0.0 45.00   0.0  40.0 80.0  40.0 40.00  40.0
## CV residual      16.6 -2.88 -23.9  8.25 -11.2 -10.2 31.9 -12.6 -5.45 -31.9
##                   204
## Predicted        43.43
## cvpred           43.69
## Survey_occupancy 40.00
## CV residual      -3.69
##
## Sum of squares = 6538    Mean square = 311    n = 21
##
## fold 8
## Observations in test set: 21
##                      14   24    26    44    50    65    71    84    87
## Predicted        15.91 22.6 28.85  11.6 15.10 15.56  38.6 28.28  15.1
## cvpred           16.95 21.4 27.64  11.5 14.92 15.92  38.9 29.32  16.2
## Survey_occupancy 22.50 22.5 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       5.55  1.1 -5.14 -11.5  7.58  6.58 -16.4 -6.82 -16.2
##                     88   97   114   116  121   126   131   151   165   167
## Predicted         11.5 21.6 14.34  25.0 43.6 38.75 24.12  23.5  54.4 34.25
## cvpred            12.5 20.4 14.17  24.8 43.4 38.55 24.48  24.6  53.2 33.05
## Survey_occupancy   0.0 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.00
## CV residual      -12.5 47.1  8.33 -24.8 24.1  6.45 -1.98 -24.6 -13.2  6.95
##                   173   211
## Predicted        52.7  7.75
## cvpred           51.5  8.15
## Survey_occupancy 80.0  0.00
## CV residual      28.5 -8.15
##
## Sum of squares = 6254    Mean square = 298    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        24.9 15.02 17.3 17.23  18.2  16.0 15.56  7.61 14.28 48.57
## cvpred           23.5 14.63 16.8 16.77  17.7  16.5 16.09  7.77 14.26 47.93
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50  0.00 22.50 45.00
## CV residual      21.5  7.87 28.2  5.73 -17.7 -16.5  6.41 -7.77  8.24 -2.93
```

```
##                    101  113   117   123   144   148  152   154   178   198
## Predicted        64.41 27.0  19.6 24.62 16.54  15.2 58.6 74.89  52.3 81.26
## cvpred           63.33 27.9  20.7 25.57 17.14  15.4 57.6 73.46  52.3 81.32
## Survey_occupancy 67.50 22.5   0.0 22.50 22.50   0.0 80.0 80.00  40.0 80.00
## CV residual       4.17 -5.4 -20.7 -3.07  5.36 -15.4 22.4  6.54 -12.3 -1.32
##                    205
## Predicted         31.2
## cvpred            32.1
## Survey_occupancy   0.0
## CV residual      -32.1
##
## Sum of squares = 4588    Mean square = 218    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21    22    35    43    49   77    78
## Predicted          6.31  8.67 30.01 19.60 17.80 19.13 26.50 25.6  8.03
## cvpred             6.55  9.03 31.05 20.11 18.22 19.27 27.02 25.9  7.45
## Survey_occupancy   0.00  0.00 22.50 22.50 22.50 22.50 22.50 45.0  0.00
## CV residual       -6.55 -9.03 -8.55  2.39  4.28  3.23 -4.52 19.1 -7.45
##                     83   90    94   112   138  142  149   162   169   179
## Predicted        15.97 25.8 26.37  19.7 11.68 18.4 25.4  45.3 46.23 46.23
## cvpred           15.79 26.1 26.31  19.0  9.54 16.6 24.8  45.7 46.28 46.28
## Survey_occupancy 22.50 45.0 22.50   0.0  0.00 45.0 40.0   0.0 40.00 40.00
## CV residual       6.71 18.9 -3.81 -19.0 -9.54 28.4 15.2 -45.7 -6.28 -6.28
##                    185   207
## Predicted        13.9 10.13
## cvpred           12.0  6.99
## Survey_occupancy 40.0 80.00
## CV residual      28.0 73.01
##
## Sum of squares = 10862    Mean square = 517    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 322


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  59964   59964  190.25 <2e-16 ***
## Room                 1    242     242    0.77   0.38
## Course_Level         5    873     175    0.55   0.74
## Residuals          205  64614     315
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19    30   34    48    54    76    89
## Predicted           7.08 14.38 29.9 26.6 21.23 29.6 28.70 19.16 28.75  10.0
## cvpred              7.78 13.44 29.8 26.6 21.42 28.2 28.68 19.41 29.85  10.6
## Survey_occupancy    0.00 22.50 45.0 45.0 22.50 22.5 22.50 22.50 22.50   0.0
## CV residual        -7.78  9.06 15.2 18.4  1.08 -5.7 -6.18  3.09 -7.35 -10.6
##                      120   122   134   136   168  188   196   202  203   206
## Predicted          17.40 31.03 14.42  13.0 48.54 61.7  15.7  17.1 54.0  8.31
## cvpred             16.35 30.92 13.45  13.5 49.06 60.0  16.1  17.4 51.9  8.92
## Survey_occupancy   22.50 22.50 22.50   0.0 40.00 80.0   0.0   0.0 80.0 40.00
## CV residual         6.15 -8.42  9.05 -13.5 -9.06 20.0 -16.1 -17.4 28.1 31.08
##                      213
## Predicted           9.32
## cvpred              9.89
## Survey_occupancy    0.00
## CV residual        -9.89
##
## Sum of squares = 4225    Mean square = 201    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18    42      47    74    86   91   106
## Predicted           9.07 26.64  11.6 13.22 22.7321  7.12  35.7 46.2 62.88
## cvpred              9.64 26.42  12.1 13.72 22.5859  7.18  41.5 46.6 62.18
## Survey_occupancy    0.00 22.50   0.0 22.50 22.5000  0.00  22.5 67.5 67.50
## CV residual        -9.64 -3.92 -12.1  8.78 -0.0859 -7.18 -19.0 20.9  5.32
##                       107  118   125   133  146    160  174   176   182   183
## Predicted           55.1 27.5 18.66  8.68 29.1   9.93 42.2  53.4  17.0 71.57
```

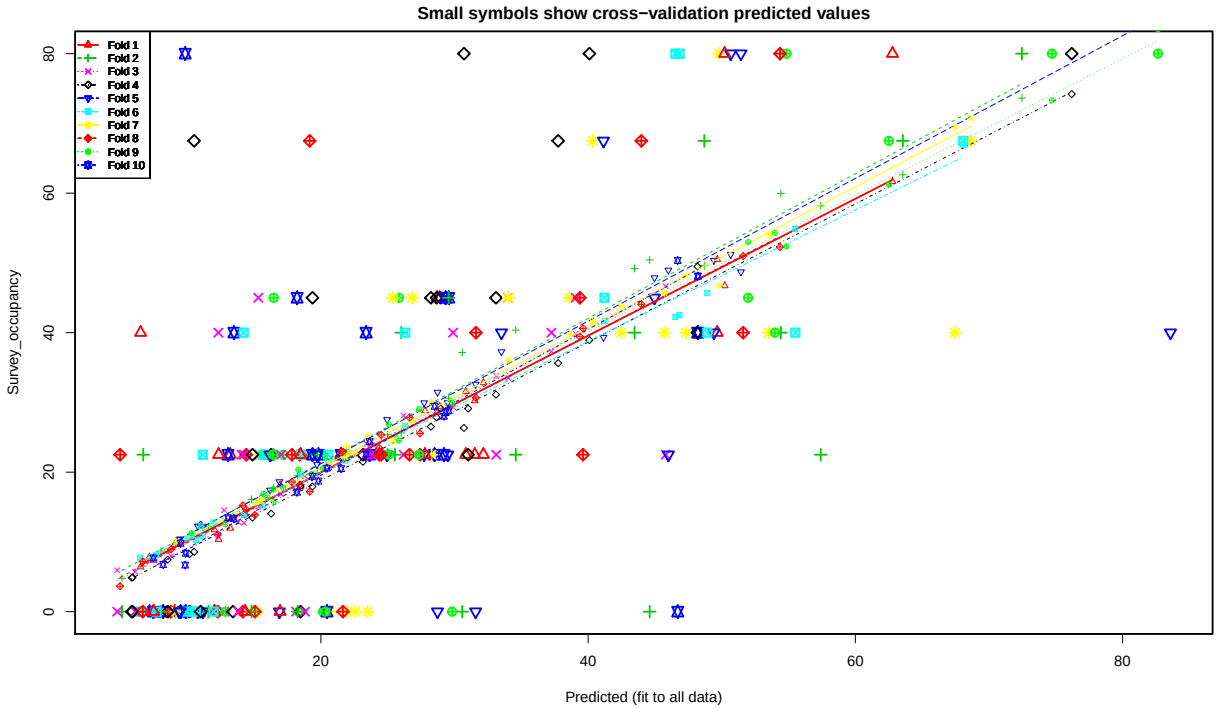
```
## cvpred            55.3 27.9 18.51  8.71 29.2  10.82 48.1  59.1  17.8 71.63
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0   0.00 40.0  40.0   0.0 80.00
## CV residual      -32.8 17.1  3.99 13.79 10.8 -10.82 -8.1 -19.1 -17.8  8.37
##                    189   191   215
## Predicted         29.2  13.5  46.8
## cvpred            35.3  14.3  52.6
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -35.3 -14.3 -52.6
##
## Sum of squares = 8052    Mean square = 366    n = 22
##
## fold 3
## Observations in test set: 22
##                      1    2     7    27    40    55    57    62    69
## Predicted         8.74 16.3 14.94  15.6 14.60  34.3 40.36  47.2 27.55
## cvpred            8.45 16.5 15.07  15.8 14.73  34.7 40.88  47.8 29.24
## Survey_occupancy  0.00 22.5 22.50   0.0 22.50  22.5 45.00  22.5 22.50
## CV residual      -8.45  6.0  7.43 -15.8  7.77 -12.2  4.12 -25.3 -6.74
##                     79    92   95   98    103   108   128  139  166   175
## Predicted         6.76  17.6 32.8 11.8 22.288 22.68  14.8 16.3 29.6 10.82
## cvpred            7.62  18.6 32.7 11.0 23.393 23.79  15.8 15.6 28.9  9.57
## Survey_occupancy  0.00   0.0 45.0 22.5 22.500 22.50   0.0 45.0 40.0 40.00
## CV residual      -7.62 -18.6 12.3 11.5 -0.893 -1.29 -15.8 29.4 11.1 30.43
##                    187   194  209
## Predicted         12.5 37.20  7.9
## cvpred            11.3 36.67  6.6
## Survey_occupancy   0.0 40.00  0.0
## CV residual      -11.3  3.33 -6.6
##
## Sum of squares = 4359    Mean square = 198    n = 22
##
## fold 4
## Observations in test set: 22
##                       3     5   29    45   53   58   60   67     70   82
## Predicted         10.13 17.19 26.9  16.1 26.5 28.5 34.3 19.4 24.127 11.5
## cvpred             8.88 15.98 26.2  14.9 25.0 26.8 32.7 18.0 22.755 10.5
## Survey_occupancy  0.00 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.500 67.5
## CV residual      -8.88  6.52 18.8 -14.9 20.0 18.2 12.3 27.0 -0.255 57.0
##                    130   135   140   141  161  172   180   186  197   201
## Predicted         40.0 33.15 16.69  9.39 32.4 76.8  11.9 47.18 40.1  7.70
## cvpred            38.6 31.87 15.79  8.46 29.1 74.8  11.3 48.12 39.0  7.11
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.0   0.0 40.00 80.0  0.00
## CV residual       28.9 -9.37  6.71 -8.46 50.9  5.2 -11.3 -8.12 41.0 -7.11
##                    210   216
## Predicted         12.6  7.64
## cvpred            14.3  7.06
## Survey_occupancy   0.0  0.00
## CV residual      -14.3 -7.06
##
## Sum of squares = 11397    Mean square = 518    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32    33    61    64    66    68    75    80
```

```
## Predicted         12.3 19.11 27.49 25.97 29.11  29.8  47.7  18.8  12.6
## cvpred            12.7 20.32 28.17 27.33 29.83  31.3  48.9  20.1  13.7
## Survey_occupancy   0.0 22.50 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual      -12.7  2.18 -5.67 -4.83 -7.33 -31.3 -26.4 -20.1 -13.7
##                    85    102   127   132   156   159  163   171   192  195
## Predicted        42.4 42.415 20.78 17.20 35.21  86.2 50.3  31.3  49.6 51.2
## cvpred           39.7 45.912 21.19 17.53 38.64  90.8 47.9  32.9  51.6 52.6
## Survey_occupancy 67.5 45.000 22.50 22.50 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual      27.8 -0.912  1.31  4.97  1.36 -50.8 32.1 -32.9 -11.6 27.4
##                    208   214
## Predicted         11.3  11.3
## cvpred            11.6  11.6
## Survey_occupancy   0.0   0.0
## CV residual      -11.6 -11.6
##
## Sum of squares = 9190    Mean square = 438    n = 21
##
## fold 6
## Observations in test set: 21
##                      9    63   72    73    93    99   104   109   111
## Predicted         11.9 15.65 11.1  8.27 19.53 19.35 40.12  6.37 18.64
## cvpred            12.3 14.96 10.5  8.15 19.11 20.28 40.22  7.73 19.67
## Survey_occupancy   0.0 22.50 22.5  0.00 22.50 22.50 45.00  0.00 22.50
## CV residual      -12.3  7.54 12.0 -8.15  3.39  2.22  4.78 -7.73  2.83
##                     115   137   143   153   155  158  181  184   190   199
## Predicted        67.631  11.5  14.0  11.9  12.3 28.6 45.8 45.5  56.1 51.20
## cvpred           66.994  11.3  15.1  12.1  12.4 28.3 42.9 42.6  56.4 48.17
## Survey_occupancy 67.500   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual       0.506 -11.3 -15.1 -12.1 -12.4 11.7 37.1 37.4 -16.4 -8.17
##                    200  212
## Predicted         10.3 16.2
## cvpred            11.6 16.2
## Survey_occupancy   0.0 40.0
## CV residual      -11.6 23.8
##
## Sum of squares = 5132    Mean square = 244    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20    23    38    41   46    51    52   81   100
## Predicted         23.6 12.93  11.8  21.5 26.40 38.4 36.61  18.3 26.3 19.49
## cvpred            23.8 12.78  11.1  22.6 27.62 39.0 37.17  18.3 25.6 19.37
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0 22.50
## CV residual      -23.8  9.72 -11.1 -22.6 -5.12 28.5  7.83 -18.3 19.4  3.13
##                    105  110   119   124   129   150  157   164   170   177
## Predicted        24.6 68.2  20.9 33.28  11.2  50.8 51.8  52.5 42.39  67.9
## cvpred           24.7 70.1  22.4 35.06  12.3  52.5 49.4  53.0 43.83  70.1
## Survey_occupancy 45.0 67.5   0.0 45.00   0.0  40.0 80.0  40.0 40.00  40.0
## CV residual      20.3 -2.6 -22.4  9.94 -12.3 -12.5 30.6 -13.0 -3.83 -30.1
##                    204
## Predicted        47.92
## cvpred           48.27
## Survey_occupancy 40.00
## CV residual      -8.27
```

```
##
## Sum of squares = 6332    Mean square = 302    n = 21
##
## fold 8
## Observations in test set: 21
##                      14     24    26    44    50    65    71    84    87
## Predicted        15.61 21.951 25.37 10.09 16.04 18.72  40.9 27.90  15.2
## cvpred           14.65 22.192 24.35  9.17 16.32 18.98  41.0 28.15  15.5
## Survey_occupancy 22.50 22.500 22.50  0.00 22.50 22.50  22.5 22.50   0.0
## CV residual       7.85  0.308 -1.85 -9.17  6.18  3.52 -18.5 -5.65 -15.5
##                      88   97   114   116  121   126   131   151   165   167
## Predicted         10.9 18.0  4.85  15.1 43.1 38.39 26.51  24.6  51.7 30.47
## cvpred            10.0 17.1  3.65  13.9 43.3 38.63 26.83  25.1  51.9 30.82
## Survey_occupancy   0.0 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.00
## CV residual      -10.0 50.4 18.85 -13.9 24.2  6.37 -4.33 -25.1 -11.9  9.18
##                     173   211
## Predicted        53.3  8.48
## cvpred           52.1  8.97
## Survey_occupancy 80.0  0.00
## CV residual      27.9 -8.97
##
## Sum of squares = 6369    Mean square = 303    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        26.9 14.64 14.2 16.76  17.7  15.1 13.88  11.0 15.71 49.56
## cvpred           26.7 14.63 13.0 16.71  17.6  15.2 12.66  11.1 15.82 49.63
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.00
## CV residual      18.3  7.87 32.0  5.79 -17.6 -15.2  9.84 -11.1  6.68 -4.63
##                     101   113   117    123   144   148  152   154   178
## Predicted        61.81 25.29  18.1 22.975 17.42  14.8 58.5 77.20  52.9
## cvpred           61.36 25.73  18.7 23.463 18.02  16.0 58.6 77.23  53.4
## Survey_occupancy 67.50 22.50   0.0 22.500 22.50   0.0 80.0 80.00  40.0
## CV residual       6.14 -3.23 -18.7 -0.963  4.48 -16.0 21.4  2.77 -13.4
##                     198   205
## Predicted        81.95  32.9
## cvpred           81.88  33.6
## Survey_occupancy 80.00   0.0
## CV residual      -1.88 -33.6
##
## Sum of squares = 4737    Mean square = 226    n = 21
##
## fold 10
## Observations in test set: 21
##                       4      8    21    22    35   43   49   77    78   83
## Predicted          8.95   9.45 26.49 19.05 17.32 17.3 27.0 30.3  8.37 15.2
## cvpred             7.42  10.36 27.73 18.13 16.29 18.0 26.6 29.8  7.85 14.4
## Survey_occupancy   0.00   0.00 22.50 22.50 22.50 22.5 22.5 45.0  0.00 22.5
## CV residual       -7.42 -10.36 -5.23  4.37  6.21  4.5 -4.1 15.2 -7.85  8.1
##                      90     94   112   138  142  149   162   169   179  185
## Predicted         30.6 22.511  18.3  11.9 19.3 26.4  48.7 47.06 47.06 12.2
## cvpred            30.1 22.156  18.3  10.9 19.4 23.2  51.7 46.25 46.25 10.5
## Survey_occupancy 45.0 22.500   0.0   0.0 45.0 40.0   0.0 40.00 40.00 40.0
```

```
## CV residual      14.9  0.344 -18.3 -10.9 25.6 16.8 -51.7 -6.25 -6.25 29.5
##                    207
## Predicted        12.55
## cvpred            8.52
## Survey_occupancy 80.00
## CV residual      71.48
##
## Sum of squares = 10988    Mean square = 523    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 332

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  59964   59964  189.62 <2e-16 ***
## Factor_Time          3    347     116    0.37   0.78
## Course_Level         5   1187     237    0.75   0.59
## Residuals          203  64195     316
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                       6   11   12   19   30    34    48      54   76    89
## Predicted          7.17 13.2 28.7 28.9 23.7 31.52 30.84 21.4872 27.8  9.07
## cvpred             7.84 12.0 28.6 29.4 24.4 30.23 31.55 22.5718 28.8  9.66
```

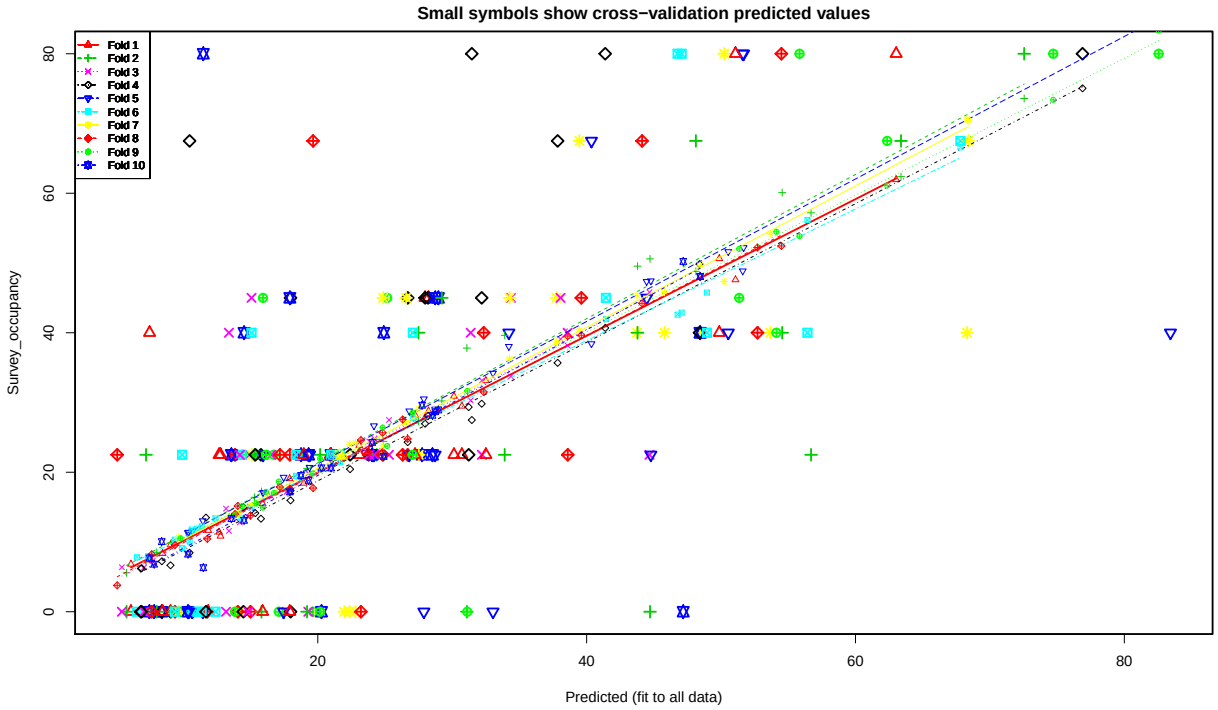
```
## Survey_occupancy  0.00 22.5 45.0 45.0 22.5 22.50 22.50 22.5000 22.5  0.00
## CV residual      -7.84 10.5 16.4 15.6 -1.9 -7.73 -9.05 -0.0718 -6.3 -9.66
##                    120   122  134   136   168  188   196   202  203   206
## Predicted        18.48  32.2 12.3  12.0  49.7 62.8  16.9  14.3 50.2  6.51
## cvpred           17.97  32.8 10.4  11.7  50.5 61.6  18.2  14.0 46.7  6.42
## Survey_occupancy 22.50  22.5 22.5   0.0  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual       4.53 -10.3 12.1 -11.7 -10.5 18.4 -18.2 -14.0 33.3 33.58
##                    213
## Predicted         7.49
## cvpred            7.37
## Survey_occupancy  0.00
## CV residual      -7.37
##
## Sum of squares = 4637    Mean square = 221    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17    18    42    47    74    86   91   106
## Predicted         9.12 25.54  11.6 16.48 24.99  5.11  34.6 48.7 63.56
## cvpred            9.78 25.17  12.2 17.74 25.36  4.77  40.4 49.6 62.63
## Survey_occupancy  0.00 22.50   0.0 22.50 22.50  0.00  22.5 67.5 67.50
## CV residual      -9.78 -2.67 -12.2  4.76 -2.86 -4.77 -17.9 17.9  4.87
##                    107  118   125   133  146   160   174   176   182   183
## Predicted         57.4 29.6 19.72  6.71 26.0  8.03 43.48  54.4  18.3 72.47
## cvpred            58.2 30.6 19.86  6.55 25.6  8.70 49.19  60.0  19.5 73.62
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0  0.00 40.00  40.0   0.0 80.00
## CV residual      -35.7 14.4  2.64 15.95 14.4 -8.70 -9.19 -20.0 -19.5  6.38
##                    189   191   215
## Predicted         30.6  14.8  44.6
## cvpred            37.2  16.1  50.4
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -37.2 -16.1 -50.4
##
## Sum of squares = 8079    Mean square = 367    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     7    27    40    55    57    62    69
## Predicted         8.80 15.44 14.07  18.1 17.02  33.1 39.07  45.8 26.19
## cvpred            7.96 15.43 14.04  17.4 16.83  33.8 39.84  46.7 28.12
## Survey_occupancy  0.00 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.50
## CV residual      -7.96  7.07  8.46 -17.4  5.67 -11.3  5.16 -24.2 -5.62
##                      79    92   95    98   103   108   128  139  166  175
## Predicted         4.76  18.8 34.0 14.24 23.42 23.80  12.8 15.3 29.9 12.3
## cvpred            5.93  19.4 33.5 12.72 24.06 24.45  14.5 15.1 29.3 10.8
## Survey_occupancy  0.00   0.0 45.0 22.50 22.50 22.50   0.0 45.0 40.0 40.0
## CV residual      -5.93 -19.4 11.5  9.78 -1.56 -1.95 -14.5 29.9 10.7 29.2
##                    187  194   209
## Predicted         13.8 37.3  6.10
## cvpred            12.8 37.3  5.73
## Survey_occupancy   0.0 40.0  0.00
## CV residual      -12.8  2.7 -5.73
##
## Sum of squares = 4217    Mean square = 192    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3     5   29    45   53   58   60   67    70    82
## Predicted         10.16 16.28 29.0  18.5 28.7 28.2 33.1 19.4 23.14 10.51
## cvpred             8.24 14.05 29.1  18.0 27.9 26.5 31.1 17.9 21.49  8.58
## Survey_occupancy  0.00 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.50
## CV residual      -8.24  8.45 15.9 -18.0 17.1 18.5 13.9 27.1  1.01 58.92
##                    130   135   140   141  161   172   180   186  197   201
## Predicted         37.8 31.03 14.88  8.53 30.7 76.20  13.4 48.19 40.1  5.90
## cvpred            35.6 29.11 13.49  7.45 26.3 74.21  13.6 49.48 38.9  4.91
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.00   0.0 40.00 80.0  0.00
## CV residual       31.9 -6.61  9.01 -7.45 53.7  5.79 -13.6 -9.48 41.1 -4.91
##                     210   216
## Predicted          11.0  5.85
## cvpred             12.4  4.86
## Survey_occupancy    0.0  0.00
## CV residual       -12.4 -4.86
##
## Sum of squares = 12019    Mean square = 546    n = 22
##
## fold 5
## Observations in test set: 21
##                       16     32    33    61    64    66    68    75    80
## Predicted          11.2 21.573 29.49 24.95 27.72  28.7  46.0  16.9  10.8
## cvpred             12.2 22.187 29.95 27.53 29.94  31.5  49.0  18.6  12.3
## Survey_occupancy    0.0 22.500 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual       -12.2  0.313 -7.45 -5.03 -7.44 -31.5 -26.5 -18.6 -12.3
##                     85   102   127   132   156   159  163   171   192  195
## Predicted         41.2 44.97 19.71 16.19 33.51  83.6 51.4  31.6  49.4 50.7
## cvpred            39.3 47.87 21.09 17.42 37.26  89.4 48.7  32.6  50.4 51.2
## Survey_occupancy 67.5 45.00 22.50 22.50 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual       28.2 -2.87  1.41  5.08  2.74 -49.4 31.3 -32.6 -10.4 28.8
##                      208    214
## Predicted           9.41   9.46
## cvpred             10.36  10.42
## Survey_occupancy    0.00   0.00
## CV residual       -10.36 -10.42
##
## Sum of squares = 8942    Mean square = 426    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63   72    73     93     99   104   109   111
## Predicted          11.0 15.65 11.2  7.37 21.837 20.536 41.22  6.46 18.51
## cvpred             12.3 15.25 10.8  7.87 21.667 21.567 41.66  7.73 19.67
## Survey_occupancy    0.0 22.50 22.5  0.00 22.500 22.500 45.00  0.00 22.50
## CV residual       -12.3  7.25 11.7 -7.87  0.833  0.933  3.34 -7.73  2.83
##                     115   137   143   153   155  158  181  184   190  199
## Predicted         68.079  10.6  12.0  10.0  10.3 26.3 46.8 46.5  55.5 48.9
## cvpred            66.917  10.3  12.8  10.5  10.8 26.7 42.5 42.2  54.9 45.7
## Survey_occupancy 67.500   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.0
## CV residual       0.583 -10.3 -12.8 -10.5 -10.8 13.3 37.5 37.8 -14.9 -5.7
##                     200  212
```

```
## Predicted         7.68 14.2
## cvpred            8.11 13.8
## Survey_occupancy  0.00 40.0
## CV residual      -8.11 26.2
##
## Sum of squares = 4989    Mean square = 238    n = 21
##
## fold 7
## Observations in test set: 21
##                      15    20    23    38    41   46    51    52   81
## Predicted         22.6 15.52  15.2  23.5 28.28 40.3 38.60  20.7 25.4
## cvpred            22.7 15.96  15.5  25.2 30.12 41.6 39.78  21.3 24.5
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0
## CV residual      -22.7  6.54 -15.5 -25.2 -7.62 25.9  5.22 -21.3 20.5
##                     100  105   110   119   124    129   150  157   164
## Predicted        21.794 26.8 68.67  22.0 34.06   9.17 47.33 49.8  53.5
## cvpred           22.239 27.4 70.74  23.6 36.07  10.07 48.15 46.7  54.0
## Survey_occupancy 22.500 45.0 67.50   0.0 45.00   0.00 40.00 80.0  40.0
## CV residual       0.261 17.6 -3.24 -23.6  8.93 -10.07 -8.15 33.3 -14.0
##                     170   177   204
## Predicted        42.48  67.5 45.70
## cvpred           43.73  69.5 45.65
## Survey_occupancy 40.00  40.0 40.00
## CV residual      -3.73 -29.5 -5.65
##
## Sum of squares = 6407    Mean square = 305    n = 21
##
## fold 8
## Observations in test set: 21
##                      14     24    26    44    50    65    71    84    87
## Predicted        14.41 24.365 27.41  12.3 18.42 17.83  39.6 26.63  14.2
## cvpred           14.63 23.448 25.56  11.0 18.22 18.59  40.6 27.85  15.2
## Survey_occupancy 22.50 22.500 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       7.87 -0.948 -3.06 -11.0  4.28  3.91 -18.1 -5.35 -15.2
##                      88   97   114   116  121   126   131   151   165   167
## Predicted         8.78 19.2  4.97  15.1 44.0 39.39 24.51  21.7  51.6 31.61
## cvpred            8.93 17.2  3.65  13.9 44.1 39.42 25.34  22.9  51.0 30.66
## Survey_occupancy  0.00 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.00
## CV residual      -8.93 50.3 18.85 -13.9 23.4  5.58 -2.84 -22.9 -11.0  9.34
##                     173   211
## Predicted        54.4  6.67
## cvpred           52.3  7.19
## Survey_occupancy 80.0  0.00
## CV residual      27.7 -7.19
##
## Sum of squares = 6114    Mean square = 291    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        25.8 17.19 16.5 19.27  20.1  18.3 16.00  10.3 15.70 51.97
## cvpred           24.5 17.74 15.7 19.74  20.6  20.4 16.36  11.2 16.89 52.99
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.00
## CV residual      20.5  4.76 29.3  2.76 -20.6 -20.4  6.14 -11.2  5.61 -7.99
```

```
##                    101   113   117   123   144   148  152   154   178  198
## Predicted        62.51 27.35  20.3 25.08 16.41  12.8 54.9 74.71  54.0 82.7
## cvpred           61.23 29.02  22.3 26.84 17.57  12.5 52.4 73.31  54.3 83.5
## Survey_occupancy 67.50 22.50   0.0 22.50 22.50   0.0 80.0 80.00  40.0 80.0
## CV residual       6.27 -6.52 -22.3 -4.34  4.93 -12.5 27.6  6.69 -14.3 -3.5
##                    205
## Predicted         29.8
## cvpred            30.0
## Survey_occupancy   0.0
## CV residual      -30.0
##
## Sum of squares = 5105    Mean square = 243    n = 21
##
## fold 10
## Observations in test set: 21
##                      4     8    21   22    35   43    49   77    78    83
## Predicted         8.19  9.50 28.51 21.5 19.82 19.4 29.21 29.3  7.47 13.05
## cvpred            6.75  9.81 29.45 20.5 18.72 19.4 28.02 28.5  7.69 13.46
## Survey_occupancy  0.00  0.00 22.50 22.5 22.50 22.5 22.50 45.0  0.00 22.50
## CV residual      -6.75 -9.81 -6.95  2.0  3.78  3.1 -5.52 16.5 -7.69  9.04
##                    90    94   112   138  142  149   162  169  179  185
## Predicted        29.6 23.64  20.4  9.88 18.2 23.4  46.7 48.2 48.2 13.5
## cvpred           28.8 24.36  20.6  8.37 17.1 22.6  50.3 48.1 48.1 13.3
## Survey_occupancy 45.0 22.50   0.0  0.00 45.0 40.0   0.0 40.0 40.0 40.0
## CV residual      16.2 -1.86 -20.6 -8.37 27.9 17.4 -50.3 -8.1 -8.1 26.7
##                   207
## Predicted         9.84
## cvpred            6.68
## Survey_occupancy 80.00
## CV residual      73.32
##
## Sum of squares = 11252    Mean square = 536    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 337


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                     Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Average_logs    1  59964   59964  189.03 <2e-16 ***
## Room                 1    242     242    0.76   0.38
## Factor_Time          3    395     132    0.42   0.74
## Course_Level         5   1014     203    0.64   0.67
## Residuals          202  64077     317
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      6   11   12   19    30    34   48     54    76    89
## Predicted         6.10 12.7 28.0 28.2 23.09 30.72 30.1 20.935 27.23  9.05
## cvpred            6.81 11.4 27.8 28.8 23.83 29.48 30.9 22.061 28.21  9.59
## Survey_occupancy  0.00 22.5 45.0 45.0 22.50 22.50 22.5 22.500 22.50  0.00
## CV residual      -6.81 11.1 17.2 16.2 -1.33 -6.98 -8.4  0.439 -5.71 -9.59
##                    120   122  134   136   168  188   196   202  203   206
## Predicted        18.96  32.5 12.8  11.8  49.9 63.0  17.9  15.9 51.1  7.48
## cvpred           18.43  33.1 10.8  11.7  50.6 61.9  19.1  15.5 47.6  7.42
## Survey_occupancy 22.50  22.5 22.5   0.0  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual       4.07 -10.6 11.7 -11.7 -10.6 18.1 -19.1 -15.5 32.4 32.58
##                    213
## Predicted         8.45
## cvpred            8.35
## Survey_occupancy  0.00
## CV residual      -8.35
##
## Sum of squares = 4599    Mean square = 219    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17    18    42   47    74    86   91   106   107
## Predicted         8.02 24.88  10.4 15.29 24.4  5.78  33.9 48.1 63.39  56.7
## cvpred            8.52 24.42  10.9 16.41 24.7  5.58  39.6 48.8 62.38  57.2
## Survey_occupancy  0.00 22.50   0.0 22.50 22.5  0.00  22.5 67.5 67.50  22.5
## CV residual      -8.52 -1.92 -10.9  6.09 -2.2 -5.58 -17.1 18.7  5.12 -34.7
##                    118   125   133  146  160   174   176   182   183   189
## Predicted        29.2 20.17  7.22 27.5  9.1 43.79  54.5  19.2 72.55  31.1
```

```
## cvpred           30.2 20.45  7.20 27.3  9.9 49.54  60.1  20.6 73.59  37.8
## Survey_occupancy 45.0 22.50 22.50 40.0  0.0 40.00  40.0   0.0 80.00   0.0
## CV residual      14.8  2.05 15.30 12.7 -9.9 -9.54 -20.1 -20.6  6.41 -37.8
##                    191   215
## Predicted         15.8  44.7
## cvpred            17.2  50.6
## Survey_occupancy   0.0   0.0
## CV residual      -17.2 -50.6
##
## Sum of squares = 8100    Mean square = 368    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     7    27    40    55    57    62   69
## Predicted         7.70 14.95 13.60  17.7 16.54  32.2 38.06  44.7 25.3
## cvpred            7.26 15.08 13.71  17.2 16.55  33.1 39.08  45.8 27.5
## Survey_occupancy  0.00 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.5
## CV residual      -7.26  7.42  8.79 -17.2  5.95 -10.6  5.92 -23.3 -5.0
##                     79    92   95    98   103  108   128  139   166  175
## Predicted         5.42  19.3 34.4 14.20 23.83 24.2  13.2 15.1 31.37 13.4
## cvpred            6.38  19.8 33.7 12.79 24.42 24.8  14.8 14.9 30.31 11.6
## Survey_occupancy  0.00   0.0 45.0 22.50 22.50 22.5   0.0 45.0 40.00 40.0
## CV residual      -6.38 -19.8 11.3  9.71 -1.92 -2.3 -14.8 30.1  9.69 28.4
##                    187   194   209
## Predicted         14.8 38.58  7.08
## cvpred            13.6 38.17  6.37
## Survey_occupancy   0.0 40.00  0.00
## CV residual      -13.6  1.83 -6.37
##
## Sum of squares = 4151    Mean square = 189    n = 22
##
## fold 4
## Observations in test set: 22
##                      3     5   29    45 53   58   60 67    70    82  130
## Predicted         9.05 15.77 28.2  18.0 28 26.7 32.2 18 22.40 10.46 37.8
## cvpred            6.65 13.33 28.1  17.4 27 24.3 29.8 16 20.44  8.46 35.7
## Survey_occupancy  0.00 22.50 45.0   0.0 45 45.0 45.0 45 22.50 67.50 67.5
## CV residual      -6.65  9.17 16.9 -17.4 18 20.7 15.2 29  2.06 59.04 31.8
##                    135   140   141  161   172   180   186  197   201   210
## Predicted        31.23 15.35  8.40 31.5 76.89  14.5 48.40 41.4  6.89  11.7
## cvpred           29.34 14.13  7.24 27.5 75.05  15.0 49.84 40.7  6.24  13.5
## Survey_occupancy 22.50 22.50  0.00 80.0 80.00   0.0 40.00 80.0  0.00   0.0
## CV residual      -6.84  8.37 -7.24 52.5  4.95 -15.0 -9.84 39.3 -6.24 -13.5
##                    216
## Predicted         6.84
## cvpred            6.19
## Survey_occupancy  0.00
## CV residual      -6.19
##
## Sum of squares = 12124    Mean square = 551    n = 22
##
## fold 5
## Observations in test set: 21
##                      16     32    33    61    64    66    68    75    80
```

```
## Predicted         10.7 21.043 28.73 24.18 26.80  27.9  44.8  17.5  11.4
## cvpred            11.6 21.671 29.05 26.66 28.79  30.5  47.4  19.3  13.0
## Survey_occupancy   0.0 22.500 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual      -11.6  0.829 -6.55 -4.16 -6.29 -30.5 -24.9 -19.3 -13.0
##                    85   102   127  132   156   159  163   171   192  195
## Predicted        40.4 44.46 19.39 15.9 34.21  83.4 51.6  33.0  50.5 51.7
## cvpred           38.4 47.35 20.69 17.1 38.04  89.1 48.9  34.2  51.6 52.2
## Survey_occupancy 67.5 45.00 22.50 22.5 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual      29.1 -2.35  1.81  5.4  1.96 -49.1 31.1 -34.2 -11.6 27.8
##                    208   214
## Predicted         10.3  10.4
## cvpred            11.3  11.4
## Survey_occupancy   0.0   0.0
## CV residual      -11.3 -11.4
##
## Sum of squares = 8936    Mean square = 426    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63    72    73    93     99   104   109   111
## Predicted         10.6 14.32  9.90  7.38 21.66 21.000 41.43  6.55 18.38
## cvpred            11.8 13.48  9.13  7.94 21.44 22.231 41.94  7.81 19.48
## Survey_occupancy   0.0 22.50 22.50  0.00 22.50 22.500 45.00  0.00 22.50
## CV residual      -11.8  9.02 13.37 -7.94  1.06  0.269  3.06 -7.81  3.02
##                    115   137   143   153   155  158  181  184   190   199
## Predicted        67.81  10.5  12.4  11.0  11.4 27.1 47.1 46.8  56.4 48.95
## cvpred           66.59  10.0  13.4  11.9  12.2 27.7 42.9 42.6  56.2 45.76
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual       0.91 -10.0 -13.4 -11.9 -12.2 12.3 37.1 37.4 -16.2 -5.76
##                    200  212
## Predicted         9.36 15.1
## cvpred           10.33 15.0
## Survey_occupancy  0.00 40.0
## CV residual      -10.33 25.0
##
## Sum of squares = 5071    Mean square = 241    n = 21
##
## fold 7
## Observations in test set: 21
##                      15    20    23    38    41   46    51    52   81
## Predicted         22.0 15.09  14.1  22.8 27.51 39.5 37.76  20.1 24.9
## cvpred            21.9 15.37  14.0  24.2 29.06 40.4 38.64  20.5 23.8
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0
## CV residual      -21.9  7.13 -14.0 -24.2 -6.56 27.1  6.36 -20.5 21.2
##                    100  105   110   119   124    129   150  157   164
## Predicted        21.620 26.6 68.39  22.4 34.27   9.64 48.45 50.2  53.7
## cvpred           22.004 27.1 70.42  24.0 36.26  10.65 49.67 47.3  54.2
## Survey_occupancy 22.500 45.0 67.50   0.0 45.00   0.00 40.00 80.0  40.0
## CV residual       0.496 17.9 -2.92 -24.0  8.74 -10.65 -9.67 32.7 -14.2
##                    170   177  204
## Predicted        43.75  68.3 45.8
## cvpred           45.36  70.6 45.8
## Survey_occupancy 40.00  40.0 40.0
## CV residual      -5.36 -30.6 -5.8
```

```
##
## Sum of squares = 6463    Mean square = 308    n = 21
##
## fold 8
## Observations in test set: 21
##                      14     24    26    44    50    65    71    84    87
## Predicted        13.84 23.787 26.68  11.8 17.92 17.18  38.6 26.31  14.0
## cvpred           14.01 22.854 24.78  10.4 17.66 17.88  39.5 27.56  15.2
## Survey_occupancy 22.50 22.500 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       8.49 -0.354 -2.28 -10.4  4.84  4.62 -17.0 -5.06 -15.2
##                      88   97   114   116  121   126   131   151   165   167
## Predicted         9.38 19.7  5.08  15.0 44.1 39.61 24.82  23.2  52.7 32.34
## cvpred            9.56 17.7  3.78  13.8 44.2 39.64 25.66  24.6  52.2 31.51
## Survey_occupancy  0.00 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.00
## CV residual      -9.56 49.8 18.72 -13.8 23.3  5.36 -3.16 -24.6 -12.2  8.49
##                     173   211
## Predicted        54.5  7.65
## cvpred           52.4  8.24
## Survey_occupancy 80.0  0.00
## CV residual      27.6 -8.24
##
## Sum of squares = 6121    Mean square = 291    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28   31    36    37    39     56    59    96
## Predicted        25.2 16.73 15.9 18.8  19.6  17.1 15.44   9.79 14.37 51.35
## cvpred           23.8 17.03 14.9 19.0  19.8  18.7 15.52  10.52 15.14 52.01
## Survey_occupancy 45.0 22.50 45.0 22.5   0.0   0.0 22.50   0.00 22.50 45.00
## CV residual      21.2  5.47 30.1  3.5 -19.8 -18.7  6.98 -10.52  7.36 -7.01
##                     101   113   117   123   144   148  152   154   178   198
## Predicted        62.4 27.05  20.2 24.82 16.15  13.8 55.8 74.71  54.1 82.55
## cvpred           61.1 28.55  21.9 26.41 17.18  13.8 53.8 73.39  54.5 83.32
## Survey_occupancy 67.5 22.50   0.0 22.50 22.50   0.0 80.0 80.00  40.0 80.00
## CV residual       6.4 -6.05 -21.9 -3.91  5.32 -13.8 26.2  6.61 -14.5 -3.32
##                     205
## Predicted          31.1
## cvpred             31.6
## Survey_occupancy    0.0
## CV residual       -31.6
##
## Sum of squares = 5145    Mean square = 245    n = 21
##
## fold 10
## Observations in test set: 21
##                       4      8    21    22    35    43    49   77    78
## Predicted          7.82   8.39 27.76 20.99 19.32 18.75 28.53 28.7  7.47
## cvpred             6.82  10.05 29.61 20.61 18.83 19.53 28.16 28.7  7.70
## Survey_occupancy   0.00   0.00 22.50 22.50 22.50 22.50 22.50 45.0  0.00
## CV residual       -6.82 -10.05 -7.11  1.89  3.67  2.97 -5.66 16.3 -7.70
##                      83   90    94   112   138  142  149   162   169   179
## Predicted         13.57 29.0 24.05  20.3 10.34 17.9 24.9  47.2 48.44 48.44
## cvpred            13.35 28.9 24.28  20.6  8.26 17.2 22.3  50.2 48.06 48.06
## Survey_occupancy 22.50 45.0 22.50   0.0  0.00 45.0 40.0   0.0 40.00 40.00
```

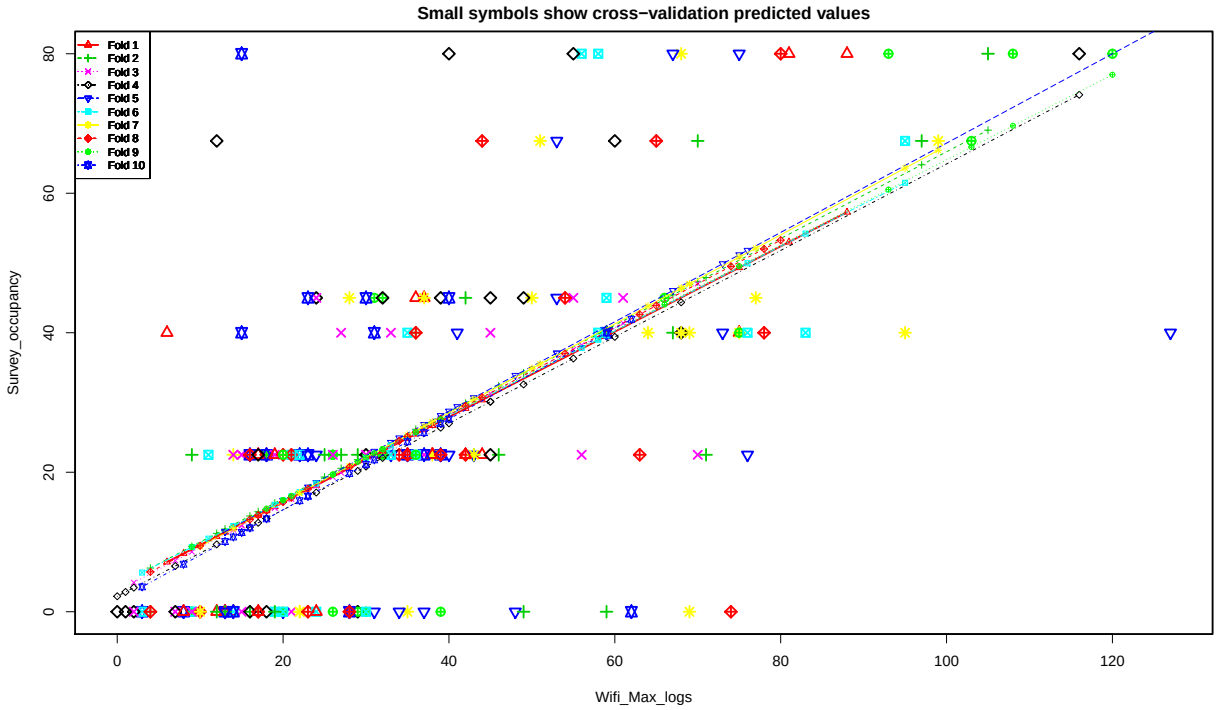
```
## CV residual       9.15 16.1 -1.78 -20.6 -8.26 27.8 17.7 -50.2 -8.06 -8.06
##                    185   207
## Predicted        14.5 11.48
## cvpred           13.1  6.32
## Survey_occupancy 40.0 80.00
## CV residual      26.9 73.68
##
## Sum of squares = 11314    Mean square = 539    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 338
```

Models	MSE
Survey_occupancy ~ 1	`attr(out.null.model, "ms")`
Survey_occupancy ~ Wifi_Average_logs	`attr(out.lm.avg, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Room	`attr(out.lm.avg.room, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Factor_Time	`attr(out.lm.avg.time, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Course_Level	`attr(out.lm.avg.level, "ms")`
Survey_occupancy ~ Wifi_Average_logs + Room + Factor_Time	`attr(out.lm.avg.room.time, "ms"`
Survey_occupancy ~ Wifi_Average_logs + Room + Course_Level	`attr(out.lm.avg.room.level, "ms`
Survey_occupancy ~ Wifi_Average_logs + Factor_Time + Course_Level	`attr(out.lm.avg.time.level, "ms`
Survey_occupancy ~ Wifi_Average_logs + Room + Factor_Time + Course_Level	`attr(out.lm.avg.full, "ms")`

CASE 2: MODEL SELECTION WITH RESPONSE VARIABLE MAX CLIENTS WITHOUT OUTLIERS

The best model was again the model with only the average logs as dependent variable. The MSE was slighty improved from the first time.

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421     166 <2e-16 ***
## Residuals     211  70272     333
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      6    11   12   19     30    34   48    54   76    89
## Wifi_Max_logs     14 18.00 37.0 36.0 32.000 44.00 38.0 19.00 38.0  13.0
## cvpred            12 14.46 26.1 25.5 23.028 30.37 26.7 15.08 26.7  11.4
## Survey_occupancy   0 22.50 45.0 45.0 22.500 22.50 22.5 22.50 22.5   0.0
## CV residual      -12  8.04 18.9 19.5 -0.528 -7.87 -4.2  7.42 -4.2 -11.4
##                     120   122   134   136   168  188   196   202 203   206
## Wifi_Max_logs    35.00 42.00 17.00  12.0 75.00 88.0  17.0  24.0  81  6.00
## cvpred           24.86 29.14 13.85  10.8 49.33 57.3  13.9  18.1  53  7.12
## Survey_occupancy 22.50 22.50 22.50   0.0 40.00 80.0   0.0   0.0  80 40.00
## CV residual      -2.36 -6.64  8.65 -10.8 -9.33 22.7 -13.9 -18.1  27 32.88
##                     213
## Wifi_Max_logs      8.00
## cvpred             8.35
## Survey_occupancy   0.00
## CV residual       -8.35
##
## Sum of squares = 4475    Mean square = 213    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18     42    47    74    86   91   106
## Wifi_Max_logs     16.0 46.00  17.0 29.000 27.00  4.00 43.00 70.0 97.00
## cvpred            13.7 32.37  14.3 21.806 20.56  6.26 30.51 47.3 64.08
## Survey_occupancy   0.0 22.50   0.0 22.500 22.50  0.00 22.50 67.5 67.50
## CV residual      -13.7 -9.87 -14.3  0.694  1.94 -6.26 -8.01 20.2  3.42
##                     107  118   125   133  146   160    174   176   182
## Wifi_Max_logs      71.0 42.0 25.00  9.00 36.0  13.0 59.000 67.00  19.0
```

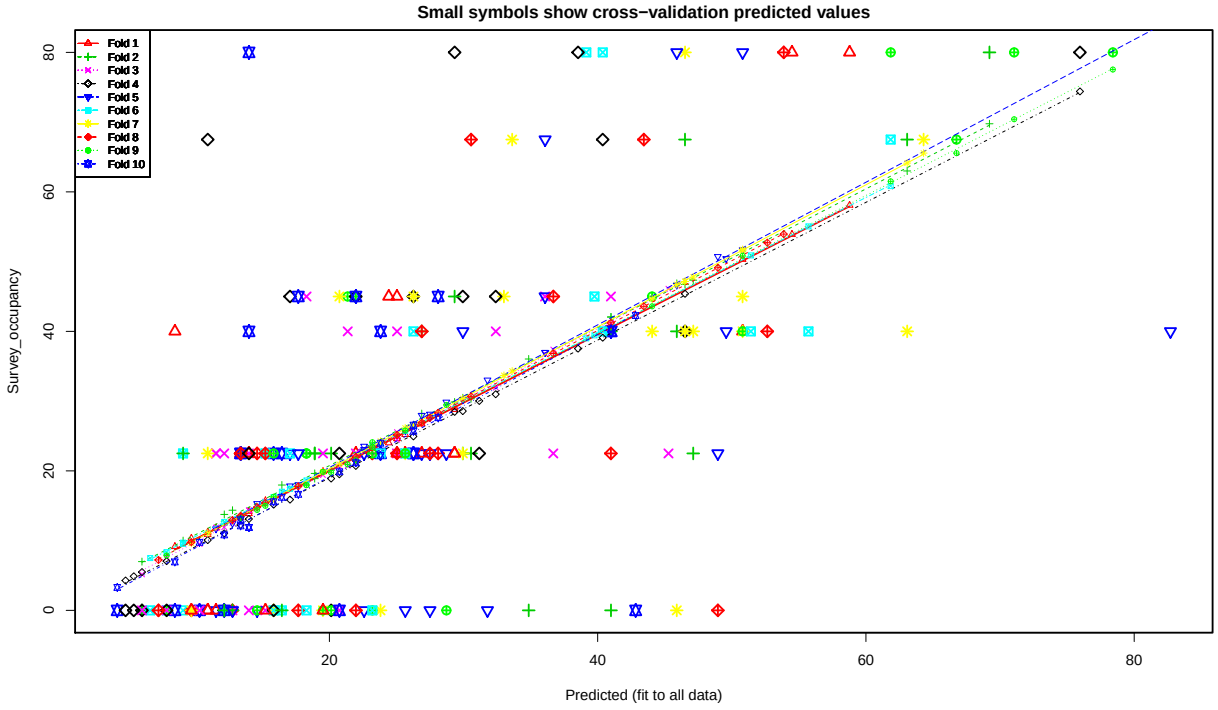
```
## cvpred            47.9 29.9 19.32  9.37 26.2  11.9 40.456 45.43  15.6
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0   0.0 40.000 40.00   0.0
## CV residual      -25.4 15.1  3.18 13.13 13.8 -11.9 -0.456 -5.43 -15.6
##                    183   189   191   215
## Wifi_Max_logs    105.0  49.0  12.0  59.0
## cvpred            69.1  34.2  11.2  40.5
## Survey_occupancy  80.0   0.0   0.0   0.0
## CV residual       10.9 -34.2 -11.2 -40.5
##
## Sum of squares = 5736    Mean square = 261    n = 22
##
## fold 3
## Observations in test set: 22
##                      1    2    7    27   40    55    57    62    69    79
## Wifi_Max_logs     21.0 15.0 15.0  19.0 19.0  56.0 55.00  70.0 37.00  7.00
## cvpred            16.2 12.4 12.4  14.9 14.9  38.2 37.59  47.0 26.24  7.33
## Survey_occupancy   0.0 22.5 22.5   0.0 22.5  22.5 45.00  22.5 22.50  0.00
## CV residual      -16.2 10.1 10.1 -14.9  7.6 -15.7  7.41 -24.5 -3.74 -7.33
##                     92    95   98   103    108   128  139  166  175   187
## Wifi_Max_logs     28.0 61.00 14.0 26.00 30.000  15.0 24.0 33.0 27.0  9.00
## cvpred            20.6 41.37 11.7 19.31 21.832  12.4 18.1 23.7 19.9  8.59
## Survey_occupancy   0.0 45.00 22.5 22.50 22.500   0.0 45.0 40.0 40.0  0.00
## CV residual      -20.6  3.63 10.8  3.19  0.668 -12.4 26.9 16.3 20.1 -8.59
##                    194   209
## Wifi_Max_logs    45.00  2.00
## cvpred           31.29  4.18
## Survey_occupancy 40.00  0.00
## CV residual       8.71 -4.18
##
## Sum of squares = 3995    Mean square = 182    n = 22
##
## fold 4
## Observations in test set: 22
##                      3     5   29    45   53   58   60   67    70    82
## Wifi_Max_logs     29.0 18.00 39.0  16.0 32.0 45.0 49.0 24.0 30.00 12.00
## cvpred            20.2 13.37 26.4  12.1 22.1 30.1 32.6 17.1 20.81  9.65
## Survey_occupancy   0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.50
## CV residual      -20.2  9.13 18.6 -12.1 22.9 14.9 12.4 27.9  1.69 57.85
##                    130   135   140   141 161    172   180   186  197   201
## Wifi_Max_logs    60.0 45.00 17.00  7.00  40 116.00  18.0 68.00 55.0  2.00
## cvpred           39.4 30.11 12.75  6.56  27  74.11  13.4 44.36 36.3  3.46
## Survey_occupancy 67.5 22.50 22.50  0.00  80  80.00   0.0 40.00 80.0  0.00
## CV residual      28.1 -7.61  9.75 -6.56  53   5.89 -13.4 -4.36 43.7 -3.46
##                    210   216
## Wifi_Max_logs     0.00  1.00
## cvpred            2.22  2.84
## Survey_occupancy  0.00  0.00
## CV residual      -2.22 -2.84
##
## Sum of squares = 11975    Mean square = 544    n = 22
##
## fold 5
## Observations in test set: 21
##                    16    32    33    61    64    66    68  75    80   85
```

```
## Wifi_Max_logs     20 24.00 43.00 33.00 40.00  48.0  76.0  31  13.0 53.0
## cvpred            16 18.52 30.69 24.28 28.77  33.9  51.8  23  11.5 37.1
## Survey_occupancy   0 22.50 22.50 22.50 22.50   0.0  22.5   0   0.0 67.5
## CV residual      -16  3.98 -8.19 -1.78 -6.27 -33.9 -29.3 -23 -11.5 30.4
##                    102   127   132  156   159  163   171  192  195   208
## Wifi_Max_logs    53.00 39.00 23.00 41.0 127.0 67.0  37.0 73.0 75.0  13.0
## cvpred           37.09 28.13 17.88 29.4  84.5 46.1  26.8 49.9 51.2  11.5
## Survey_occupancy 45.00 22.50 22.50 40.0  40.0 80.0   0.0 40.0 80.0   0.0
## CV residual       7.91 -5.63  4.62 10.6 -44.5 33.9 -26.8 -9.9 28.8 -11.5
##                    214
## Wifi_Max_logs     34.0
## cvpred            24.9
## Survey_occupancy   0.0
## CV residual      -24.9
##
## Sum of squares = 9734    Mean square = 464    n = 21
##
## fold 6
## Observations in test set: 21
##                      9    63   72    73    93    99   104   109   111
## Wifi_Max_logs     9.00 21.00 11.0  9.00 33.00 22.00 59.00  24.0 36.00
## cvpred            9.26 16.55 10.5  9.26 23.84 17.16 39.64  18.4 25.66
## Survey_occupancy  0.00 22.50 22.5  0.00 22.50 22.50 45.00   0.0 22.50
## CV residual      -9.26  5.95 12.0 -9.26 -1.34  5.34  5.36 -18.4 -3.16
##                    115   137   143   153 155  158 181  184   190   199
## Wifi_Max_logs    95.00  14.0  20.0  19.0  30 35.0  58 56.0  83.0 76.00
## cvpred           61.51  12.3  15.9  15.3  22 25.1  39 37.8  54.2 49.96
## Survey_occupancy 67.50   0.0   0.0   0.0   0 40.0  80 80.0  40.0 40.00
## CV residual       5.99 -12.3 -15.9 -15.3 -22 14.9  41 42.2 -14.2 -9.96
##                    200    212
## Wifi_Max_logs     3.00 58.000
## cvpred            5.62 39.028
## Survey_occupancy  0.00 40.000
## CV residual      -5.62  0.972
##
## Sum of squares = 5935    Mean square = 283    n = 21
##
## fold 7
## Observations in test set: 21
##                     15   20  23    38    41   46   51  52   81   100  105
## Wifi_Max_logs     28.0 14.0  22  35.0 38.00 51.0 50.0  22 28.0 43.00 37.0
## cvpred            20.8 11.9  17  25.3 27.23 35.5 34.9  17 20.8 30.42 26.6
## Survey_occupancy   0.0 22.5   0   0.0 22.50 67.5 45.0   0 45.0 22.50 45.0
## CV residual      -20.8 10.6 -17 -25.3 -4.73 32.0 10.1 -17 24.2 -7.92 18.4
##                    110 119   124   129   150  157   164   170   177   204
## Wifi_Max_logs    99.00  69 77.00 10.00 69.00 68.0 64.00  75.0  95.0 68.00
## cvpred           66.16  47 52.12  9.36 47.01 46.4 43.82  50.8  63.6 46.37
## Survey_occupancy 67.50   0 45.00  0.00 40.00 80.0 40.00  40.0  40.0 40.00
## CV residual       1.34 -47 -7.12 -9.36 -7.01 33.6 -3.82 -10.8 -23.6 -6.37
##
## Sum of squares = 8159    Mean square = 389    n = 21
##
## fold 8
## Observations in test set: 21
```

```
##                       14    24    26    44    50    65    71    84    87
## Wifi_Max_logs    18.00 34.00 42.00  17.0 20.00 21.00  63.0 35.00  23.0
## cvpred           14.47 24.48 29.49  13.8 15.72 16.35  42.6 25.11  17.6
## Survey_occupancy 22.50 22.50 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       8.03 -1.98 -6.99 -13.8  6.78  6.15 -20.1 -2.61 -17.6
##                     88   97   114   116  121 126   131   151 165  167  173
## Wifi_Max_logs    10.00 44.0 16.00  74.0 65.0  54 39.00  28.0  78 36.0 80.0
## cvpred            9.46 30.7 13.22  49.5 43.9  37 27.61  20.7  52 25.7 53.3
## Survey_occupancy  0.00 67.5 22.50   0.0 67.5  45 22.50   0.0  40 40.0 80.0
## CV residual      -9.46 36.8  9.28 -49.5 23.6   8 -5.11 -20.7 -12 14.3 26.7
##                     211
## Wifi_Max_logs      4.00
## cvpred             5.71
## Survey_occupancy   0.00
## CV residual       -5.71
##
## Sum of squares = 7266    Mean square = 346    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31  36    37    39   56    59    96
## Wifi_Max_logs    32.0 21.00 31.0 18.00  20  29.0 26.00  9.0 26.00 66.00
## cvpred           23.3 16.62 22.7 14.79  16  21.5 19.67  9.3 19.67 44.06
## Survey_occupancy 45.0 22.50 45.0 22.50   0   0.0 22.50  0.0 22.50 45.00
## CV residual      21.7  5.88 22.3  7.71 -16 -21.5  2.83 -9.3  2.83  0.94
##                     101    113   117   123   144   148  152   154   178
## Wifi_Max_logs    103.000 32.000  26.0 36.00 20.00  30.0 93.0 108.0 75.00
## cvpred            66.625 23.324  19.7 25.76 16.01  22.1 60.5  69.7 49.55
## Survey_occupancy  67.500 22.500   0.0 22.50 22.50   0.0 80.0  80.0 40.00
## CV residual        0.875 -0.824 -19.7 -3.26  6.49 -22.1 19.5  10.3 -9.55
##                     198   205
## Wifi_Max_logs    120.00  39.0
## cvpred            76.99  27.6
## Survey_occupancy  80.00   0.0
## CV residual        3.01 -27.6
##
## Sum of squares = 4159    Mean square = 198    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21    22    35    43    49   77    78   83
## Wifi_Max_logs     3.00  13.0 39.00 23.00 18.00 22.00 35.00 40.0  8.00 16.0
## cvpred            3.56  10.1 26.97 16.57 13.32 15.92 24.37 27.6  6.81 12.0
## Survey_occupancy  0.00   0.0 22.50 22.50 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual      -3.56 -10.1 -4.47  5.93  9.18  6.58 -1.87 17.4 -6.81 10.5
##                     90    94   112   138  142  149   162     169     179
## Wifi_Max_logs    30.0 37.00  28.0  14.0 23.0 31.0  62.0 59.0000 59.0000
## cvpred           21.1 25.67  19.8  10.7 16.6 21.8  41.9 39.9771 39.9771
## Survey_occupancy 45.0 22.50   0.0   0.0 45.0 40.0   0.0 40.0000 40.0000
## CV residual      23.9 -3.17 -19.8 -10.7 28.4 18.2 -41.9  0.0229  0.0229
##                    185  207
## Wifi_Max_logs    15.0 15.0
## cvpred           11.4 11.4
## Survey_occupancy 40.0 80.0
```

```
## CV residual      28.6 68.6
##
## Sum of squares = 10276    Mean square = 489    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 337
```

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  166.08 <2e-16 ***
## Room            1    193     193    0.58   0.45
## Residuals     210  70079     334
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19     30    34    48    54    76
## Predicted          10.9 13.38 25.0 24.4 21.970 29.33 25.65 14.00 26.88
## cvpred             10.9 13.27 24.6 24.0 21.628 28.79 25.21 13.87 26.72
## Survey_occupancy    0.0 22.50 45.0 45.0 22.500 22.50 22.50 22.50 22.50
## CV residual       -10.9  9.23 20.4 21.0  0.872 -6.29 -2.71  8.63 -4.22
##                       89   120   122   134   136   168  188   196   202  203
## Predicted          11.5 25.04 29.33 14.00  10.9  50.8 58.8  15.2  19.5 54.5
## cvpred             11.8 24.93 29.11 14.19  11.2  50.3 58.1  15.7  19.9 53.9
## Survey_occupancy    0.0 22.50 22.50 22.50   0.0  40.0 80.0   0.0   0.0 80.0
```

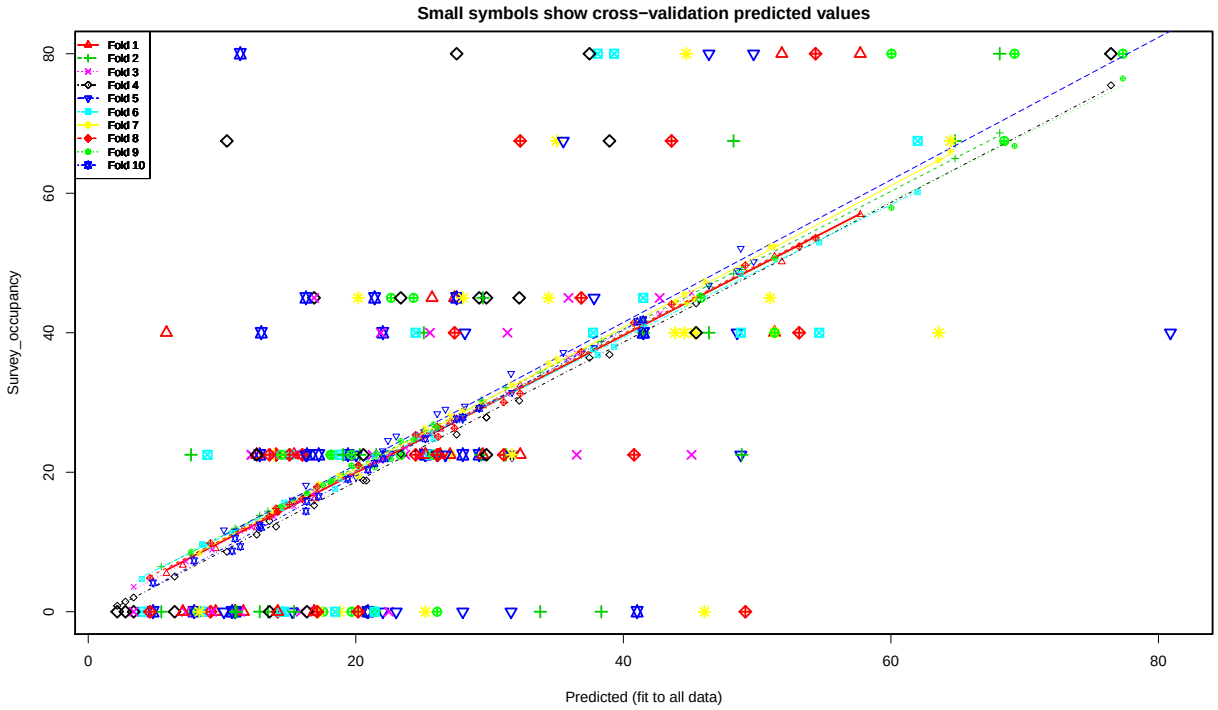
```
## CV residual      -11.8 -2.43 -6.61  8.31 -11.2 -10.3 21.9 -15.7 -19.9 26.1
##                    206    213
## Predicted         8.48   9.71
## cvpred            9.14  10.33
## Survey_occupancy 40.00   0.00
## CV residual      30.86 -10.33
##
## Sum of squares = 4553    Mean square = 217    n = 21
##
## fold 2
## Observations in test set: 22
##                     13    17    18   42    47    74    86   91  106   107
## Predicted         12.2 30.56  12.8 20.1 18.90  6.03 29.95 46.5 63.1  47.1
## cvpred            12.3 30.34  12.9 20.1 18.89  6.99 30.48 46.7 63.0  47.3
## Survey_occupancy   0.0 22.50   0.0 22.5 22.50  0.00 22.50 67.5 67.5  22.5
## CV residual      -12.3 -7.84 -12.9  2.4  3.61 -6.99 -7.98 20.8  4.5 -24.8
##                    118   125   133  146   160   174   176   182  183   189
## Predicted        29.3 18.91  9.09 26.9  12.8 40.99 45.90  16.5 69.2  34.9
## cvpred           29.9 19.64 10.00 28.2  14.4 42.06 46.88  18.0 69.8  36.0
## Survey_occupancy 45.0 22.50 22.50 40.0   0.0 40.00 40.00   0.0 80.0   0.0
## CV residual      15.1  2.86 12.50 11.8 -14.4 -2.06 -6.88 -18.0 10.2 -36.0
##                    191   215
## Predicted         12.2  41.0
## cvpred            13.8  42.1
## Survey_occupancy   0.0   0.0
## CV residual      -13.8 -42.1
##
## Sum of squares = 6052    Mean square = 275    n = 22
##
## fold 3
## Observations in test set: 22
##                       1    2    7    27    40    55    57    62    69    79
## Predicted         15.2 11.5 11.5  14.0 14.00  36.7 36.08  45.3 25.04  7.87
## cvpred            15.6 11.9 11.9  14.3 14.35  37.4 36.77  46.1 25.56  7.57
## Survey_occupancy   0.0 22.5 22.5   0.0 22.50  22.5 45.00  22.5 22.50  0.00
## CV residual      -15.6 10.6 10.6 -14.3  8.15 -14.9  8.23 -23.6 -3.06 -7.57
##                     92    95   98   103    108   128  139  166  175   187
## Predicted         20.7 40.99 12.2 19.52 21.974  12.8 18.3 25.0 21.4 10.32
## cvpred            20.7 41.21 11.9 19.41 21.897  12.6 18.2 24.5 20.7  9.51
## Survey_occupancy   0.0 45.00 22.5 22.50 22.500   0.0 45.0 40.0 40.0  0.00
## CV residual      -20.7  3.79 10.6  3.09  0.603 -12.6 26.8 15.5 19.3 -9.51
##                    194   209
## Predicted        32.41  6.03
## cvpred           31.94  5.15
## Survey_occupancy 40.00  0.00
## CV residual       8.06 -5.15
##
## Sum of squares = 3891    Mean square = 177    n = 22
##
## fold 4
## Observations in test set: 22
##                       3    5   29    45   53   58   60   67   70   82  130
## Predicted         20.1 13.4 26.3  12.2 22.0 29.9 32.4 17.1 20.7 10.9 40.4
## cvpred            18.9 12.2 24.9  11.0 20.7 28.6 31.0 15.9 19.5 10.1 39.1
```

```
## Survey_occupancy   0.0 22.5 45.0   0.0 45.0 45.0 45.0 45.0 22.5 67.5 67.5
## CV residual      -18.9 10.3 20.1 -11.0 24.3 16.4 14.0 29.1  3.0 57.4 28.4
##                    135  140   141  161  172   180   186  197   201   210
## Predicted        31.18 14.0  7.87 29.3 76.0  15.8 46.51 38.5  6.03  4.80
## cvpred           30.03 13.1  7.06 28.5 74.4  15.2 45.39 37.5  5.49  4.28
## Survey_occupancy 22.50 22.5  0.00 80.0 80.0   0.0 40.00 80.0  0.00  0.00
## CV residual      -7.53  9.4 -7.06 51.5  5.6 -15.2 -5.39 42.5 -5.49 -4.28
##                    216
## Predicted         5.42
## cvpred            4.88
## Survey_occupancy  0.00
## CV residual      -4.88
##
## Sum of squares = 12022    Mean square = 546    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32    33    61    64    66    68    75    80
## Predicted          14.6 17.06 28.72 22.58 26.88  31.8  49.0  22.6  11.5
## cvpred             15.3 17.84 29.86 23.53 27.96  33.0  50.7  23.1  11.7
## Survey_occupancy    0.0 22.50 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual      -15.3  4.66 -7.36 -1.03 -5.46 -33.0 -28.2 -23.1 -11.7
##                     85   102   127   132   156   159  163   171   192  195
## Predicted        36.1 36.08 27.49 17.68 29.95  82.7 45.9  27.5  49.6 50.8
## cvpred           37.0 36.98 28.13 18.01 30.19  84.6 46.6  27.7  50.4 51.7
## Survey_occupancy 67.5 45.00 22.50 22.50 40.00  40.0 80.0   0.0  40.0 80.0
## CV residual      30.5  8.02 -5.63  4.49  9.81 -44.6 33.4 -27.7 -10.4 28.3
##                    208   214
## Predicted         12.8  25.7
## cvpred            12.5  25.8
## Survey_occupancy   0.0   0.0
## CV residual      -12.5 -25.8
##
## Sum of squares = 9637    Mean square = 459    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63    72    73    93    99   104   109   111
## Predicted          7.86 15.22  9.09  9.09 23.81 17.07 39.76  18.3 25.65
## cvpred             8.35 15.48  9.54  9.71 23.97 17.43 39.43  18.6 25.76
## Survey_occupancy   0.00 22.50 22.50  0.00 22.50 22.50 45.00   0.0 22.50
## CV residual       -8.35  7.02 12.96 -9.71 -1.47  5.07  5.57 -18.6 -3.26
##                     115   137   143   153   155  158  181  184   190   199
## Predicted         61.84  12.2  15.8  16.5  23.2 26.3 40.4 39.2  55.7  51.4
## cvpred            60.83  12.7  16.2  17.0  23.5 26.5 40.2 39.0  55.1  50.9
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0  40.0
## CV residual       6.67 -12.7 -16.2 -17.0 -23.5 13.5 39.8 41.0 -15.1 -10.9
##                     200   212
## Predicted          6.64 40.38
## cvpred             7.50 40.19
## Survey_occupancy   0.00 40.00
## CV residual       -7.50 -0.19
##
## Sum of squares = 5959    Mean square = 284    n = 21
```

```
##
## fold 7
## Observations in test set: 21
##                      15   20    23    38    41   46   51    52   81   100
## Predicted         19.5 10.9  15.8  23.8 25.65 33.6 33.0  15.8 20.7 29.95
## cvpred            19.9 11.1  16.1  24.3 26.14 34.3 33.7  16.1 20.9 30.36
## Survey_occupancy   0.0 22.5   0.0   0.0 22.50 67.5 45.0   0.0 45.0 22.50
## CV residual      -19.9 11.4 -16.1 -24.3 -3.64 33.2 11.3 -16.1 24.1 -7.86
##                    105   110   119   124   129   150  157   164   170   177
## Predicted        26.3 64.30  45.9 50.80  9.71 47.13 46.5 44.06  50.8  63.1
## cvpred           26.6 65.56  46.7 51.73  9.62 47.78 47.2 44.64  51.6  64.1
## Survey_occupancy 45.0 67.50   0.0 45.00  0.00 40.00 80.0 40.00  40.0  40.0
## CV residual      18.4  1.94 -46.7 -6.73 -9.62 -7.78 32.8 -4.64 -11.6 -24.1
##                    204
## Predicted        46.51
## cvpred           47.15
## Survey_occupancy 40.00
## CV residual      -7.15
##
## Sum of squares = 8104    Mean square = 386    n = 21
##
## fold 8
## Observations in test set: 21
##                       14     24    26    44    50    65    71    84    87
## Predicted         13.38 23.197 28.10  12.8 14.61 15.22  41.0 25.04  17.7
## cvpred            13.56 23.397 28.31  12.9 14.79 15.41  41.2 25.15  17.8
## Survey_occupancy 22.50 22.500 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       8.94 -0.897 -5.81 -12.9  7.71  7.09 -18.7 -2.65 -17.8
##                      88   97   114   116  121   126   131 151   165  167
## Predicted         9.71 30.6 13.39  49.0 43.4 36.70 27.49  22  52.6 26.9
## cvpred            9.78 30.7 13.47  49.1 43.6 36.83 27.61  22  52.7 26.9
## Survey_occupancy  0.00 67.5 22.50   0.0 67.5 45.00 22.50   0  40.0 40.0
## CV residual      -9.78 36.8  9.03 -49.1 23.9  8.17 -5.11 -22 -12.7 13.1
##                    173   211
## Predicted        53.9  7.26
## cvpred           53.9  7.23
## Survey_occupancy 80.0  0.00
## CV residual      26.1 -7.23
##
## Sum of squares = 7223    Mean square = 344    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        22.0 15.22 21.4 13.38  14.6  20.1 18.29  7.86 18.29 44.06
## cvpred           21.5 14.99 20.9 13.21  14.4  19.7 17.96  7.87 17.96 43.59
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50  0.00 22.50 45.00
## CV residual      23.5  7.51 24.1  9.29 -14.4 -19.7  4.54 -7.87  4.54  1.41
##                     101    113   117   123   144   148  152   154   178
## Predicted        66.75 23.201  19.5 25.65 15.84  23.2 61.8 71.05  50.8
## cvpred           65.56 23.409  19.8 25.78 16.29  24.1 61.5 70.42  50.8
## Survey_occupancy 67.50 22.500   0.0 22.50 22.50   0.0 80.0 80.00  40.0
## CV residual       1.94 -0.909 -19.8 -3.28  6.21 -24.1 18.5  9.58 -10.8
##                     198   205
```

```
## Predicted        78.41  28.7
## cvpred           77.54  29.5
## Survey_occupancy 80.00   0.0
## CV residual       2.46 -29.5
##
## Sum of squares = 4429    Mean square = 211    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21    22    35    43    49   77    78   83
## Predicted         4.18 10.32 26.26 16.45 13.38 15.84 23.81 28.1  8.48 13.4
## cvpred            3.29  9.75 26.55 16.21 12.98 15.57 23.97 27.6  6.94 12.1
## Survey_occupancy  0.00  0.00 22.50 22.50 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual      -3.29 -9.75 -4.05  6.29  9.52  6.93 -1.47 17.4 -6.94 10.4
##                     90    94   112   138  142  149   162    169    179  185
## Predicted        22.0 26.27  20.7  12.2 17.7 23.8  42.8 40.993 40.993 14.0
## cvpred           21.2 25.68  19.9  10.8 16.6 22.2  42.3 40.326 40.326 11.9
## Survey_occupancy 45.0 22.50   0.0   0.0 45.0 40.0   0.0 40.000 40.000 40.0
## CV residual      23.8 -3.18 -19.9 -10.8 28.4 17.8 -42.3 -0.326 -0.326 28.1
##                   207
## Predicted        14.0
## cvpred           11.9
## Survey_occupancy 80.0
## CV residual      68.1
##
## Sum of squares = 10187    Mean square = 485    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 338


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  164.67 <2e-16 ***
## Factor_Time     3    266      89    0.26   0.85
## Residuals     208  70005     337
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19    30    34    48    54    76    89
## Predicted          11.6 14.05 25.7 27.4 24.93 32.29 27.04 15.39 26.31  11.0
## cvpred             11.9 14.26 25.6 27.7 25.31 32.46 27.14 15.82 26.17  11.3
## Survey_occupancy    0.0 22.50 45.0 45.0 22.50 22.50 22.50 22.50 22.50   0.0
## CV residual       -11.9  8.24 19.4 17.3 -2.81 -9.96 -4.64  6.68 -3.67 -11.3
##                      120   122  134   136   168  188   196   202  203   206
## Predicted          25.20 29.50 12.6  9.53  51.3 57.7  14.2  16.9 51.8  5.85
## cvpred             25.35 29.52 12.0  9.04  50.9 56.9  14.6  16.2 50.2  5.47
## Survey_occupancy   22.50 22.50 22.5  0.00  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual        -2.85 -7.02 10.5 -9.04 -10.9 23.1 -14.6 -16.2 29.8 34.53
##                      213
## Predicted           7.07
## cvpred              6.66
## Survey_occupancy    0.00
## CV residual        -6.66
##
## Sum of squares = 4703    Mean square = 224    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18     42   47    74    86   91   106
## Predicted          12.8 31.22  13.4 21.523 20.3  5.46 29.38 48.2 64.80
## cvpred             13.8 32.16  14.4 22.128 20.9  6.46 30.33 48.5 64.98
## Survey_occupancy    0.0 22.50   0.0 22.500 22.5  0.00 22.50 67.5 67.50
## CV residual       -13.8 -9.66 -14.4  0.372  1.6 -6.46 -7.83 19.0  2.52
##                      107  118   125   133  146 160   174   176   182  183
## Predicted          48.8 29.5 19.07  7.69 25.1  11 41.49 46.40  15.4 68.1
```

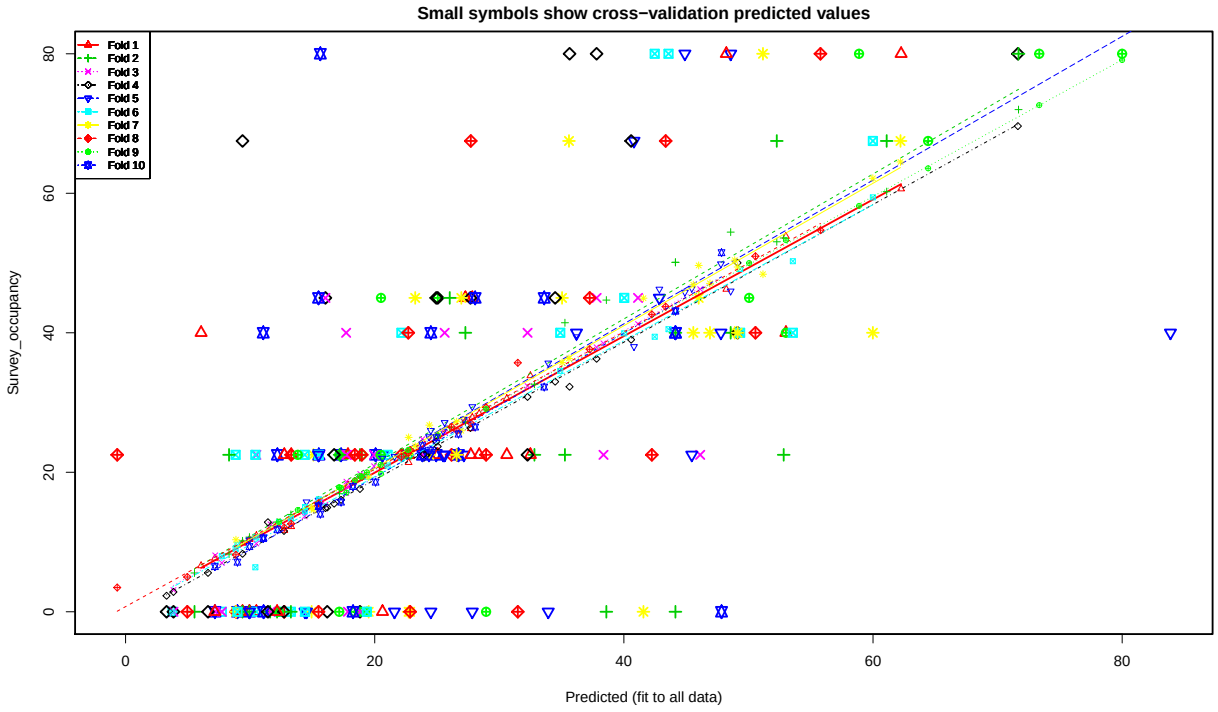
```
## cvpred            49.1 30.1 19.68  8.17 26.0  12 41.72 46.62  16.0 68.6
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0   0 40.00 40.00   0.0 80.0
## CV residual      -26.6 14.9  2.82 14.33 14.0 -12 -1.72 -6.62 -16.0 11.4
##                    189   191   215
## Predicted         33.8  11.1  38.4
## cvpred            34.4  11.7  38.8
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -34.4 -11.7 -38.8
##
## Sum of squares = 5700    Mean square = 259    n = 22
##
## fold 3
## Observations in test set: 22
##                      1    2    7    27    40    55    57    62    69    79
## Predicted         15.9 12.2 12.2  17.0 15.39  36.5 35.90  45.1 24.86  7.30
## cvpred            15.9 12.1 12.1  16.7 15.09  37.0 36.42  45.7 25.26  7.19
## Survey_occupancy   0.0 22.5 22.5   0.0 22.50  22.5 45.00  22.5 22.50  0.00
## CV residual      -15.9 10.4 10.4 -16.7  7.41 -14.5  8.58 -23.2 -2.76 -7.19
##                     92   95    98   103    108   128  139  166  175   187
## Predicted         22.5 42.7 13.89 21.25 23.705  11.4 16.9 25.5 21.9  9.26
## cvpred            22.2 42.7 13.57 21.01 23.488  11.6 17.2 25.3 21.6  8.89
## Survey_occupancy   0.0 45.0 22.50 22.50 22.500   0.0 45.0 40.0 40.0  0.00
## CV residual      -22.2  2.3  8.93  1.49 -0.988 -11.6 27.8 14.7 18.4 -8.89
##                    194   209
## Predicted        31.3  3.39
## cvpred           31.2  3.57
## Survey_occupancy 40.0  0.00
## CV residual       8.8 -3.57
##
## Sum of squares = 3894    Mean square = 177    n = 22
##
## fold 4
## Observations in test set: 22
##                      3    5   29    45   53   58   60   67    70   82  130
## Predicted         20.8 14.0 29.2  13.6 23.4 29.8 32.2 16.9 20.57 10.4 39.0
## cvpred            18.8 12.2 29.3  13.0 22.6 27.9 30.3 15.2 18.85  8.6 36.9
## Survey_occupancy   0.0 22.5 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.5 67.5
## CV residual      -18.8 10.3 15.7 -13.0 22.4 17.1 14.7 29.8  3.65 58.9 30.6
##                    135  140   141  161   172   180   186  197   201    210
## Predicted        29.77 12.6  6.46 27.5 76.45  16.3 45.44 37.5  3.39  2.167
## cvpred           27.85 11.0  5.05 25.4 75.47  16.7 44.21 36.4  2.05  0.845
## Survey_occupancy 22.50 22.5  0.00 80.0 80.00   0.0 40.00 80.0  0.00  0.000
## CV residual      -5.35 11.5 -5.05 54.6  4.53 -16.7 -4.21 43.6 -2.05 -0.845
##                   216
## Predicted         2.78
## cvpred            1.45
## Survey_occupancy  0.00
## CV residual      -1.45
##
## Sum of squares = 12586    Mean square = 572    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32    33    61    64    66    68    75    80
```

```
## Predicted         15.3 20.03 31.68 22.41 26.70  31.6  48.8  22.0  11.0
## cvpred            16.0 19.26 31.44 24.54 29.03  34.2  52.1  23.1  11.5
## Survey_occupancy   0.0 22.50 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual      -16.0  3.24 -8.94 -2.04 -6.53 -34.2 -29.6 -23.1 -11.5
##                    85   102   127   132  156   159  163   171   192  195
## Predicted        35.5 37.81 26.09 16.27 28.2  80.9 46.4  28.0 48.51 49.7
## cvpred           37.2 37.85 28.39 18.13 29.5  84.6 46.8  27.6 48.91 50.2
## Survey_occupancy 67.5 45.00 22.50 22.50 40.0  40.0 80.0   0.0 40.00 80.0
## CV residual      30.3  7.15 -5.89  4.37 10.5 -44.6 33.2 -27.6 -8.91 29.8
##                    208   214
## Predicted         10.1  23.0
## cvpred            11.7  25.2
## Survey_occupancy   0.0   0.0
## CV residual      -11.7 -25.2
##
## Sum of squares = 9827    Mean square = 468    n = 21
##
## fold 6
## Observations in test set: 21
##                      9    63    72    73    93    99   104   109   111
## Predicted         8.53 15.05  8.91  8.53 25.54 18.80 41.49  18.5 25.82
## cvpred            9.66 15.49  9.50  9.66 25.67 19.08 41.24  17.6 24.81
## Survey_occupancy  0.00 22.50 22.50  0.00 22.50 22.50 45.00   0.0 22.50
## CV residual      -9.66  7.01 13.00 -9.66 -3.17  3.42  3.76 -17.6 -2.31
##                    115   137   143   153   155  158  181  184   190   199
## Predicted        62.00  10.8  14.4  14.7  21.4 24.5 39.3 38.1  54.6 48.78
## cvpred           60.15  11.3  14.9  15.6  22.2 25.2 38.0 36.8  53.0 48.43
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual       7.35 -11.3 -14.9 -15.6 -22.2 14.8 42.0 43.2 -13.0 -8.43
##                    200   212
## Predicted         4.01 37.74
## cvpred            4.71 37.65
## Survey_occupancy  0.00 40.00
## CV residual      -4.71  2.35
##
## Sum of squares = 6016    Mean square = 286    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20    23    38    41   46    51    52   81   100
## Predicted         20.2 13.89  18.8  25.2 27.04 35.0 34.40  17.2 20.2  31.7
## cvpred            19.4 14.59  19.5  26.3 28.19 36.2 35.62  18.3 19.4  32.5
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0  22.5
## CV residual      -19.4  7.91 -19.5 -26.3 -5.69 31.3  9.38 -18.3 25.6 -10.0
##                    105   110   119   124   129   150  157   164   170   177
## Predicted        28.0 64.45  46.1 50.96  8.30 45.32 44.7 44.56  51.3  63.6
## cvpred           28.8 65.97  47.4 52.35  8.42 44.84 44.2 45.55  52.4  64.8
## Survey_occupancy 45.0 67.50   0.0 45.00  0.00 40.00 80.0 40.00  40.0  40.0
## CV residual      16.2  1.53 -47.4 -7.35 -8.42 -4.84 35.8 -5.55 -12.4 -24.8
##                    204
## Predicted        43.87
## cvpred           44.34
## Survey_occupancy 40.00
## CV residual      -4.34
```

```
##
## Sum of squares = 8455    Mean square = 403    n = 21
##
## fold 8
## Observations in test set: 21
##                     14    24    26    44    50    65    71    84    87
## Predicted        14.0 26.16 31.06  14.2 16.00 15.05  40.8 24.47  17.1
## cvpred           14.8 25.07 30.03  14.3 16.16 15.36  41.4 25.34  17.9
## Survey_occupancy 22.5 22.50 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       7.7 -2.57 -7.53 -14.3  6.34  7.14 -18.9 -2.84 -17.9
##                     88   97   114   116  121   126   131   151   165  167
## Predicted         9.14 32.3 13.55  49.1 43.6 36.86 26.09  20.2  53.1 27.4
## cvpred            9.83 31.3 13.68  49.7 44.1 37.26 26.53  21.0  52.4 26.3
## Survey_occupancy  0.00 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.0
## CV residual      -9.83 36.2  8.82 -49.7 23.4  7.74 -4.03 -21.0 -12.4 13.7
##                    173   211
## Predicted        54.4  4.62
## cvpred           53.6  4.82
## Survey_occupancy 80.0  0.00
## CV residual      26.4 -4.82
##
## Sum of squares = 7184    Mean square = 342    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59
## Predicted        22.6 18.19 24.3 16.35  17.6  21.5 19.68  7.69 18.11
## cvpred           21.9 18.76 24.7 16.99  18.2  22.7 20.95  8.60 18.64
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50  0.00 22.50
## CV residual      23.1  3.74 20.3  5.51 -18.2 -22.7  1.55 -8.60  3.86
##                      96    101   113   117   123  144   148  152  154
## Predicted        45.783 68.475 23.36  19.7 25.82 14.4  21.4 60.0 69.2
## cvpred           45.336 67.188 24.49  20.9 26.85 15.1  20.7 57.9 66.8
## Survey_occupancy 45.000 67.500 22.50   0.0 22.50 22.5   0.0 80.0 80.0
## CV residual      -0.336  0.312 -1.99 -20.9 -4.35  7.4 -20.7 22.1 13.2
##                    178   198   205
## Predicted         51.3 77.33  26.1
## cvpred            50.7 76.46  26.3
## Survey_occupancy  40.0 80.00   0.0
## CV residual      -10.7  3.54 -26.3
##
## Sum of squares = 4357    Mean square = 207    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21   22    35    43    49   77    78   83
## Predicted         4.85  11.0 29.22 19.4 16.35 17.23 25.20 27.5  7.91 12.8
## cvpred            4.13  10.5 29.16 19.0 15.83 16.54 24.79 27.6  7.31 12.4
## Survey_occupancy  0.00   0.0 22.50 22.5 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual      -4.13 -10.5 -6.66  3.5  6.67  5.96 -2.29 17.4 -7.31 10.1
##                    90    94   112  138  142  149   162   169   179  185
## Predicted        21.4 28.00  20.9 10.8 16.3 22.0  41.0 41.49 41.49 12.9
## cvpred           21.3 27.89  20.3  8.7 14.4 21.9  41.6 41.85 41.85 12.1
## Survey_occupancy 45.0 22.50   0.0  0.0 45.0 40.0   0.0 40.00 40.00 40.0
```

```
## CV residual      23.7 -5.39 -20.3 -8.7 30.6 18.1 -41.6 -1.85 -1.85 27.9
##                    207
## Predicted        11.37
## cvpred            9.33
## Survey_occupancy 80.00
## CV residual      70.67
##
## Sum of squares = 10580    Mean square = 504    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 344

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  168.93 <2e-16 ***
## Course_Level    5   2692     538    1.64   0.15
## Residuals     206  67580     328
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6   11   12   19    30    34    48    54    76    89
## Predicted          10.5 13.3 27.8 27.3 25.06 27.71 28.39 17.85  32.5  9.94
## cvpred             10.9 12.2 27.9 27.3 25.17 26.25 28.41 18.15  33.8 10.37
## Survey_occupancy    0.0 22.5 45.0 45.0 22.50 22.50 22.50 22.50  22.5  0.00
```

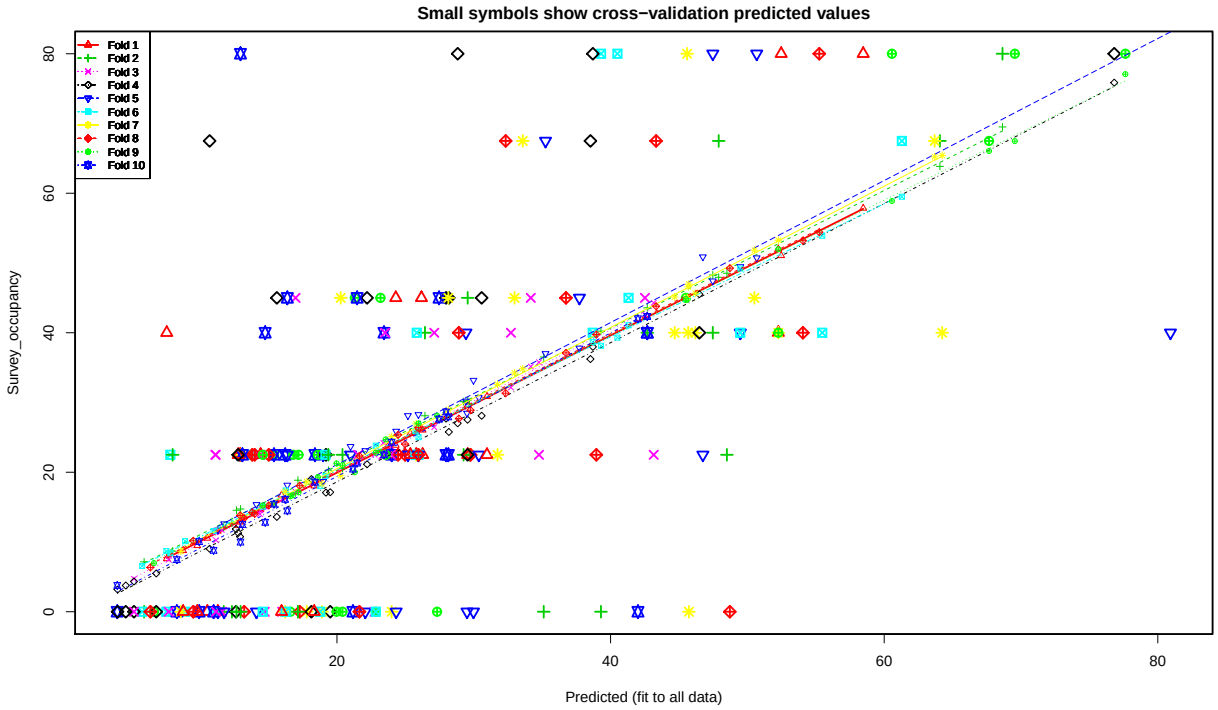
```
## CV residual      -10.9 10.3 17.1 17.7 -2.67 -3.75 -5.91  4.35 -11.3 -10.37
##                    120   122  134   136   168  188   196   202  203   206
## Predicted        22.72 30.60 12.7  9.39  53.0 62.3  12.2  20.6 48.2  6.06
## cvpred           21.39 30.57 11.7  9.83  53.8 60.6  12.5  20.8 46.2  6.59
## Survey_occupancy 22.50 22.50 22.5  0.00  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual       1.11 -8.07 10.8 -9.83 -13.8 19.4 -12.5 -20.8 33.8 33.41
##                    213
## Predicted         7.17
## cvpred            7.67
## Survey_occupancy  0.00
## CV residual      -7.67
##
## Sum of squares = 4895    Mean square = 233    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17    18    42     47    74    86   91   106
## Predicted         11.6  32.8  12.2 18.81 22.287  5.53  35.3 52.3 61.10
## cvpred            12.3  32.6  12.9 19.37 22.336  5.56  41.4 53.0 60.23
## Survey_occupancy   0.0  22.5   0.0 22.50 22.500  0.00  22.5 67.5 67.50
## CV residual      -12.3 -10.1 -12.9  3.13  0.164 -5.56 -18.9 14.5  7.27
##                    107  118   125   133  146    160   174   176   182  183
## Predicted         52.8 26.0 17.18  8.31 27.3   9.94  44.1  48.6  13.3 71.7
## cvpred            53.6 26.4 16.93  8.27 27.2  10.71  50.1  54.4  14.0 72.0
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0   0.00  40.0  40.0   0.0 80.0
## CV residual      -31.1 18.6  5.57 14.23 12.8 -10.71 -10.1 -14.4 -14.0  8.0
##                    189    191   215
## Predicted         38.6   9.39  44.1
## cvpred            44.7  10.16  50.1
## Survey_occupancy   0.0   0.00   0.0
## CV residual      -44.7 -10.16 -50.1
##
## Sum of squares = 8085    Mean square = 367    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     7    27    40    55    57    62    69
## Predicted         14.4 15.63 15.63  17.9 17.85  38.4 37.81  46.1 23.83
## cvpred            13.7 15.69 15.69  17.9 17.91  38.5 37.92  46.3 24.76
## Survey_occupancy   0.0 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.50
## CV residual      -13.7  6.81  6.81 -17.9  4.59 -16.0  7.08 -23.8 -2.26
##                     79    92    95    98   103   108   128  139  166  175
## Predicted         7.20  18.8 41.14 10.50 17.73 19.95  11.6 16.0 25.6 17.7
## cvpred            8.09  19.8 41.25  9.78 18.65 20.87  12.5 15.3 25.7 17.0
## Survey_occupancy  0.00   0.0 45.00 22.50 22.50 22.50   0.0 45.0 40.0 40.0
## CV residual      -8.09 -19.8  3.75 12.72  3.85  1.63 -12.5 29.7 14.3 23.0
##                    187   194   209
## Predicted         7.73 32.27  3.85
## cvpred            7.00 32.36  3.11
## Survey_occupancy  0.00 40.00  0.00
## CV residual      -7.00  7.64 -3.11
##
## Sum of squares = 4033    Mean square = 183    n = 22
##
```

```
## fold 4
## Observations in test set: 22
##                       3     5   29    45   53   58   60   67     70    82
## Predicted         18.8 17.30 24.9  16.2 25.1 27.7 34.5 16.0 23.950  9.39
## cvpred            17.6 16.04 24.4  14.9 23.7 26.4 33.0 14.9 22.603  8.31
## Survey_occupancy   0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.500 67.50
## CV residual      -17.6  6.46 20.6 -14.9 21.3 18.6 12.0 30.1 -0.103 59.19
##                     130   135   140   141  161  172   180   186  197   201
## Predicted         40.6 32.27 16.74  6.62 35.6 71.6  12.7  49.1 37.8  3.85
## cvpred            39.0 30.81 15.49  5.58 32.3 69.6  11.6  50.0 36.3  2.84
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.0   0.0  40.0 80.0  0.00
## CV residual       28.5 -8.31  7.01 -5.58 47.7 10.4 -11.6 -10.0 43.7 -2.84
##                     210   216
## Predicted          11.4  3.29
## cvpred             12.8  2.29
## Survey_occupancy    0.0  0.00
## CV residual       -12.8 -2.29
##
## Sum of squares = 12030    Mean square = 547    n = 22
##
## fold 5
## Observations in test set: 21
##                       16     32    33    61    64    66    68    75    80
## Predicted          14.4 20.624 27.16 25.61 25.49  33.9  45.5  24.5  14.5
## cvpred             14.5 22.008 27.61 27.13 25.91  35.7  46.4  26.0  15.8
## Survey_occupancy    0.0 22.500 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual       -14.5  0.492 -5.11 -4.63 -3.41 -35.7 -23.9 -26.0 -15.8
##                     85   102   127   132    156   159  163   171   192  195
## Predicted         40.8 42.85 24.36 15.49 36.197  83.9 48.6  27.8 47.79 44.9
## cvpred            38.0 46.25 25.09 15.99 39.428  88.4 46.0  29.4 49.88 45.8
## Survey_occupancy 67.5 45.00 22.50 22.50 40.000  40.0 80.0   0.0 40.00 80.0
## CV residual       29.5 -1.25 -2.59  6.51  0.572 -48.4 34.0 -29.4 -9.88 34.2
##                      208   214
## Predicted           9.94  21.6
## cvpred             10.30  22.3
## Survey_occupancy    0.00   0.0
## CV residual       -10.30 -22.3
##
## Sum of squares = 10183    Mean square = 485    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63    72    73    93    99   104    109   111
## Predicted          12.3 14.38  8.84  7.73 21.03 15.51 40.03  3.765 10.42
## cvpred             12.9 14.47  9.06  7.97 20.97 16.11 39.92 -0.121  6.38
## Survey_occupancy    0.0 22.50 22.50  0.00 22.50 22.50 45.00  0.000 22.50
## CV residual       -12.9  8.03 13.44 -7.97  1.53  6.39  5.08  0.121 16.12
##                     115   137   143   153   155  158  181  184   190   199
## Predicted         59.99  10.5  14.4  13.3  19.4 22.1 43.6 42.5 49.33  53.6
## cvpred            59.42  10.7  15.0  13.4  19.3 22.1 40.5 39.4 49.14  50.3
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0 80.0 40.00  40.0
## CV residual       8.08 -10.7 -15.0 -13.4 -19.3 17.9 39.5 40.6 -9.14 -10.3
##                     200   212
## Predicted          8.98 34.89
```

```
## cvpred            9.60 34.51
## Survey_occupancy  0.00 40.00
## CV residual      -9.60  5.49
##
## Sum of squares = 5600    Mean square = 267    n = 21
##
## fold 7
## Observations in test set: 21
##                      15   20    23    38    41   46    51    52 81   100
## Predicted         22.8 15.1  14.9  22.7 24.38 35.6 35.04  19.5 27 26.58
## cvpred            22.8 14.6  14.9  25.0 26.76 36.3 35.73  19.3 26 27.24
## Survey_occupancy   0.0 22.5   0.0   0.0 22.50 67.5 45.00   0.0 45 22.50
## CV residual      -22.8  7.9 -14.9 -25.0 -4.26 31.2  9.27 -19.3 19 -4.74
##                    105  110   119   124    129   150  157   164   170   177
## Predicted        23.2 62.2  41.6 46.01   8.86 45.57 51.2 46.91  48.9  60.0
## cvpred           23.7 64.5  45.0 49.66  10.32 46.89 48.4 47.09  50.4  62.1
## Survey_occupancy 45.0 67.5   0.0 45.00   0.00 40.00 80.0 40.00  40.0  40.0
## CV residual      21.3  3.0 -45.0 -4.66 -10.32 -6.89 31.6 -7.09 -10.4 -22.1
##                    204
## Predicted        49.13
## cvpred           49.43
## Survey_occupancy 40.00
## CV residual      -9.43
##
## Sum of squares = 7660    Mean square = 365    n = 21
##
## fold 8
## Observations in test set: 21
##                      14    24    26    44    50   65    71     84    87
## Predicted        13.30 26.17 26.60  12.7 18.41 19.0  42.2 22.141  15.5
## cvpred           12.61 26.53 25.94  12.1 18.75 19.3  42.6 22.207  15.5
## Survey_occupancy 22.50 22.50 22.50   0.0 22.50 22.5  22.5 22.500   0.0
## CV residual       9.89 -4.03 -3.44 -12.1  3.75  3.2 -20.1  0.293 -15.5
##                      88   97   114   116  121   126  131   151   165  167
## Predicted         8.86 27.7 -0.67  31.5 43.4 37.26 28.9  22.8  50.6 22.7
## cvpred            8.17 27.1  3.47  35.7 43.7 37.64 29.3  23.2  51.0 22.8
## Survey_occupancy  0.00 67.5 22.50   0.0 67.5 45.00 22.5   0.0  40.0 40.0
## CV residual      -8.17 40.4 19.03 -35.7 23.8  7.36 -6.8 -23.2 -11.0 17.2
##                    173   211
## Predicted        55.8  4.95
## cvpred           54.7  4.98
## Survey_occupancy 80.0  0.00
## CV residual      25.3 -4.98
##
## Sum of squares = 6566    Mean square = 313    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59   96
## Predicted        25.1 18.96 20.5 17.30  18.4  18.8 17.73  12.3 17.15 50.1
## cvpred           25.3 19.37 19.8 17.75  18.8  19.4 17.08  12.9 17.83 50.0
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.0
## CV residual      19.7  3.13 25.2  4.75 -18.8 -19.4  5.42 -12.9  4.67 -5.0
##                    101   113   117    123  144   148  152   154   178
```

```
## Predicted        64.42 20.48  17.2 22.695 13.8  19.4 58.9 73.34  53.0
## cvpred           63.58 21.07  17.8 23.222 14.6  20.0 58.2 72.64  53.3
## Survey_occupancy 67.50 22.50   0.0 22.500 22.5   0.0 80.0 80.00  40.0
## CV residual       3.92  1.43 -17.8 -0.722  7.9 -20.0 21.8  7.36 -13.3
##                    198   205
## Predicted        79.995  28.9
## cvpred           79.108  29.1
## Survey_occupancy 80.000   0.0
## CV residual       0.892 -29.1
##
## Sum of squares = 4383    Mean square = 209    n = 21
##
## fold 10
## Observations in test set: 21
##                      4     8    21    22    35   43    49   77    78   83
## Predicted         8.98  9.94 24.94 20.07 17.30 15.5 26.72 33.6  7.17 12.2
## cvpred            7.11  9.34 24.95 18.59 15.72 15.2 25.47 32.2  6.47 11.8
## Survey_occupancy  0.00  0.00 22.50 22.50 22.50 22.5 22.50 45.0  0.00 22.5
## CV residual      -7.11 -9.34 -2.45  3.91  6.78  7.3 -2.97 12.8 -6.47 10.7
##                    90    94   112   138  142  149   162   169   179  185
## Predicted        28.1 23.83  18.3  11.1 15.5 24.5  47.8 44.14 44.14 11.1
## cvpred           26.5 23.81  17.9  10.6 15.1 23.2  51.5 43.12 43.12 10.5
## Survey_occupancy 45.0 22.50   0.0   0.0 45.0 40.0   0.0 40.00 40.00 40.0
## CV residual      18.5 -1.31 -17.9 -10.6 29.9 16.8 -51.5 -3.12 -3.12 29.5
##                   207
## Predicted        15.6
## cvpred           14.0
## Survey_occupancy 80.0
## CV residual      66.0
##
## Sum of squares = 10442    Mean square = 497    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 347


## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  164.43 <2e-16 ***
## Room            1    193     193    0.57   0.45
## Factor_Time     3    309     103    0.31   0.82
## Residuals     207  69770     337
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6    11   12   19   30    34    48    54    76    89
## Predicted           10.5 12.92 24.3 26.2 23.8 30.97 25.79 14.42 26.26  11.3
## cvpred              10.5 12.85 23.9 26.2 23.9 30.85 25.69 14.68 26.04  11.6
## Survey_occupancy     0.0 22.50 45.0 45.0 22.5 22.50 22.50 22.50 22.50   0.0
## CV residual        -10.5  9.65 21.1 18.8 -1.4 -8.35 -3.19  7.82 -3.54 -11.6
##                      120   122  134   136   168  188   196   202  203   206
## Predicted          25.36 29.55 12.8  9.79  52.3 58.5  16.0  18.3 52.5  7.56
## cvpred             25.55 29.61 12.4  9.48  52.0 57.9  16.7  18.0 51.1  7.60
## Survey_occupancy   22.50 22.50 22.5  0.00  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual        -3.05 -7.11 10.1 -9.48 -12.0 22.1 -16.7 -18.0 28.9 32.40
##                      213
## Predicted           8.76
## cvpred              8.76
## Survey_occupancy    0.00
## CV residual        -8.76
##
## Sum of squares = 4748    Mean square = 226    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18    42    47    74    86   91   106
## Predicted           11.7 29.69  12.3 20.40 19.21  5.90 29.26 47.9 64.07
## cvpred              12.1 29.79  12.7 20.54 19.37  7.15 30.12 47.9 63.85
## Survey_occupancy     0.0 22.50   0.0 22.50 22.50  0.00 22.50 67.5 67.50
## CV residual        -12.1 -7.29 -12.7  1.96  3.13 -7.15 -7.62 19.6  3.65
##                       107   118   125   133   146   160   174   176   182  183
## Predicted           48.5 29.6 19.37  7.99 26.4  12.7 42.68 47.47  17.1 68.6
```

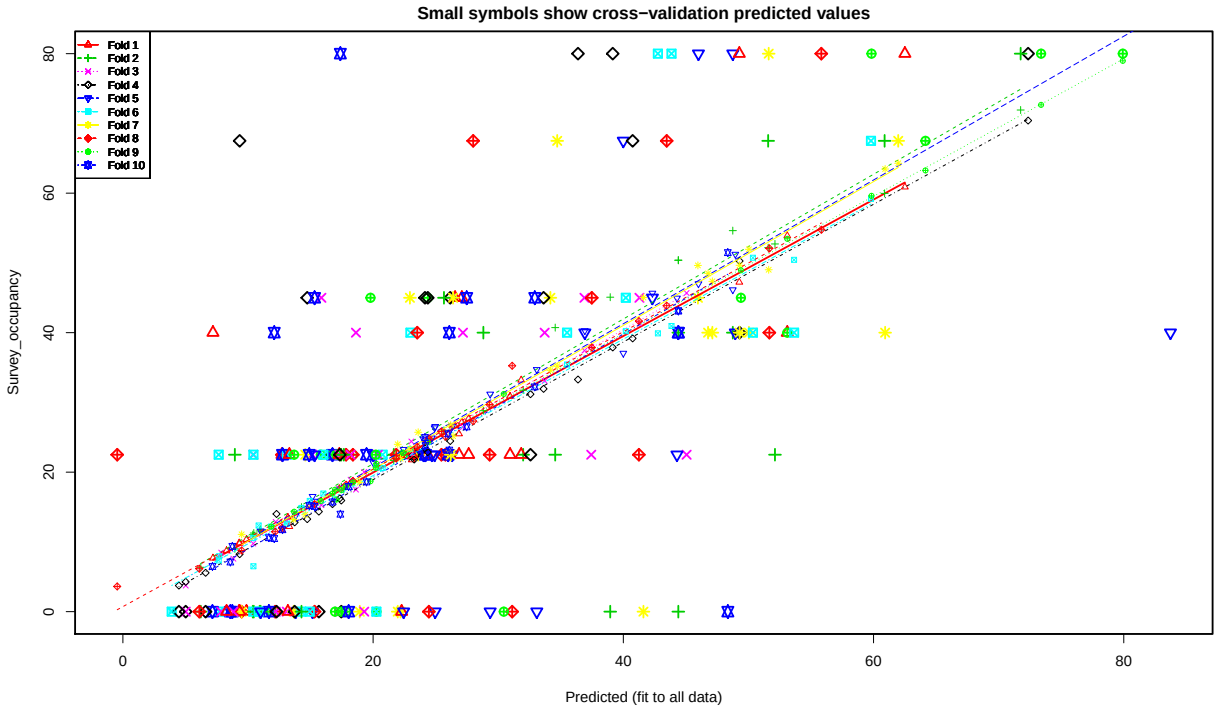
```
## cvpred            48.5 30.3 20.29  8.68 28.1  14.6 43.57 48.28  18.9 69.5
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0   0.0 40.00 40.00   0.0 80.0
## CV residual      -26.0 14.7  2.21 13.82 11.9 -14.6 -3.57 -8.28 -18.9 10.5
##                    189   191   215
## Predicted         35.1  13.0  39.3
## cvpred            36.5  14.7  40.2
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -36.5 -14.7 -40.2
##
## Sum of squares = 6040    Mean square = 275    n = 22
##
## fold 3
## Observations in test set: 22
##                      1    2    7    27    40    55    57    62    69    79
## Predicted         14.7 11.1 11.1  16.0 14.42  34.8 34.17  43.2 23.39  7.70
## cvpred            15.1 11.4 11.4  16.1 14.52  35.8 35.16  44.3 24.21  7.46
## Survey_occupancy   0.0 22.5 22.5   0.0 22.50  22.5 45.00  22.5 22.50  0.00
## CV residual      -15.1 11.1 11.1 -16.1  7.98 -13.3  9.84 -21.8 -1.71 -7.46
##                     92    95   98  103   108   128  139  166  175   187
## Predicted         22.8 42.51 14.4 21.6 23.95  11.6 17.0 27.1 23.5  11.2
## cvpred            22.5 42.59 14.0 21.3 23.73  11.7 17.2 26.5 22.8  10.2
## Survey_occupancy   0.0 45.00 22.5 22.5 22.50   0.0 45.0 40.0 40.0   0.0
## CV residual      -22.5  2.41  8.5  1.2 -1.23 -11.7 27.8 13.5 17.2 -10.2
##                    194   209
## Predicted        32.72  5.16
## cvpred           32.15  4.73
## Survey_occupancy 40.00  0.00
## CV residual       7.85 -4.73
##
## Sum of squares = 3768    Mean square = 171    n = 22
##
## fold 4
## Observations in test set: 22
##                      3    5   29    45   53   58   60   67    70    82
## Predicted         19.5 12.9 28.0  12.6 22.2 28.2 30.6 15.6 19.20 10.69
## cvpred            17.1 10.8 27.7  11.9 21.1 25.8 28.1 13.6 17.08  9.03
## Survey_occupancy   0.0 22.5 45.0   0.0 45.0 45.0 45.0 45.0 22.50 67.50
## CV residual      -17.1 11.7 17.3 -11.9 23.9 19.2 16.9 31.4  5.42 58.47
##                    130   135  140   141  161   172   180   186  197   201
## Predicted        38.5 29.55 12.8  6.79 28.8 76.81  18.1 46.49 38.7  5.16
## cvpred           36.2 27.53 11.3  5.49 27.0 75.85  19.0 45.52 38.0  4.34
## Survey_occupancy 67.5 22.50 22.5  0.00 80.0 80.00   0.0 40.00 80.0  0.00
## CV residual      31.3 -5.03 11.2 -5.49 53.0  4.15 -19.0 -5.52 42.0 -4.34
##                    210   216
## Predicted         3.97  4.56
## cvpred            3.18  3.76
## Survey_occupancy  0.00  0.00
## CV residual      -3.18 -3.76
##
## Sum of squares = 12715    Mean square = 578    n = 22
##
## fold 5
## Observations in test set: 21
##                      16    32   33    61    64    66    68    75    80   85
```

```
## Predicted         14.1 18.99 30.4 21.00 25.19  30.0  46.7  22.1  11.3 35.2
## cvpred            15.4 18.68 30.7 23.69 28.12  33.2  50.9  23.1  11.7 37.0
## Survey_occupancy   0.0 22.50 22.5 22.50 22.50   0.0  22.5   0.0   0.0 67.5
## CV residual      -15.4  3.82 -8.2 -1.19 -5.62 -33.2 -28.4 -23.1 -11.7 30.5
##                    102   127   132  156   159  163   171   192  195   208
## Predicted        37.7 25.95 16.37 29.4  80.9 47.5  29.5 49.48 50.7  11.8
## cvpred           37.8 28.26 18.15 30.2  84.6 47.4  28.5 49.47 50.7  12.6
## Survey_occupancy 45.0 22.50 22.50 40.0  40.0 80.0   0.0 40.00 80.0   0.0
## CV residual       7.2 -5.76  4.35  9.8 -44.6 32.6 -28.5 -9.47 29.3 -12.6
##                    214
## Predicted         24.3
## cvpred            25.9
## Survey_occupancy   0.0
## CV residual      -25.9
##
## Sum of squares = 9690    Mean square = 461    n = 21
##
## fold 6
## Observations in test set: 21
##                      9    63    72    73    93    99   104   109   111
## Predicted         7.53 13.81  7.82   8.9 25.75 19.16 41.32  18.8 25.96
## cvpred            8.70 14.23  8.39  10.1 25.88 19.45 41.07  18.0 25.02
## Survey_occupancy  0.00 22.50 22.50   0.0 22.50 22.50 45.00   0.0 22.50
## CV residual      -8.70  8.27 14.11 -10.1 -3.38  3.05  3.93 -18.0 -2.52
##                    115   137   143   153   155  158  181  184   190   199
## Predicted        61.3  11.0  14.6  16.3  22.8 25.8 40.5 39.3  55.5 49.48
## cvpred           59.5  11.6  15.1  17.4  23.8 26.7 39.3 38.1  53.9 49.21
## Survey_occupancy 67.5   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual       8.0 -11.6 -15.1 -17.4 -23.8 13.3 40.7 41.9 -13.9 -9.21
##                    200   212
## Predicted         5.76 38.70
## cvpred            6.56 38.69
## Survey_occupancy  0.00 40.00
## CV residual      -6.56  1.31
##
## Sum of squares = 6015    Mean square = 286    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20    23    38    41   46   51    52   81   100
## Predicted         18.9 13.00  17.8  24.0 25.79 33.6 33.0  16.2 20.3  31.7
## cvpred            18.3 13.78  18.6  25.1 26.93 34.8 34.2  17.2 19.5  32.6
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.0   0.0 45.0  22.5
## CV residual      -18.3  8.72 -18.6 -25.1 -4.43 32.7 10.8 -17.2 25.5 -10.1
##                    105   110   119   124   129   150  157   164   170   177
## Predicted        28.1 63.69  45.7 50.51  8.59 46.19 45.6 45.68  52.3  64.2
## cvpred           29.0 65.22  47.0 51.84  8.66 45.67 45.1 46.58  53.3  65.4
## Survey_occupancy 45.0 67.50   0.0 45.00  0.00 40.00 80.0 40.00  40.0  40.0
## CV residual      16.0  2.28 -47.0 -6.84 -8.66 -5.67 34.9 -6.58 -13.3 -25.4
##                    204
## Predicted        44.69
## cvpred           45.12
## Survey_occupancy 40.00
## CV residual      -5.12
```

```
##
## Sum of squares = 8376    Mean square = 399    n = 21
##
## fold 8
## Observations in test set: 21
##                      14    24    26    44    50    65    71    84    87
## Predicted         12.92 24.98 29.77  13.2 15.01 13.81  39.0 24.47  17.3
## cvpred            13.81 24.03 28.89  13.4 15.24 14.23  39.7 25.36  18.1
## Survey_occupancy 22.50 22.50 22.50   0.0 22.50 22.50  22.5 22.50   0.0
## CV residual       8.69 -1.53 -6.39 -13.4  7.26  8.27 -17.2 -2.86 -18.1
##                     88   97   114   116  121   126   131   151   165  167
## Predicted          9.5 32.3 13.99  48.7 43.3 36.74 25.95  21.6  54.1 28.9
## cvpred            10.2 31.3 14.03  49.3 43.8 37.11 26.39  22.3  53.2 27.7
## Survey_occupancy   0.0 67.5 22.50   0.0 67.5 45.00 22.50   0.0  40.0 40.0
## CV residual      -10.2 36.2  8.47 -49.3 23.7  7.89 -3.89 -22.3 -13.2 12.3
##                    173   211
## Predicted         55.3  6.36
## cvpred            54.4  6.35
## Survey_occupancy 80.0  0.00
## CV residual       25.6 -6.35
##
## Sum of squares = 7120    Mean square = 339    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28   31    36    37   39    56    59     96
## Predicted         21.3 17.19 23.2 15.4  16.6  20.4 18.6  6.62 16.80 45.507
## cvpred            20.0 17.12 22.8 15.4  16.5  21.0 19.3  6.97 16.71 44.866
## Survey_occupancy 45.0 22.50 45.0 22.5   0.0   0.0 22.5  0.00 22.50 45.000
## CV residual       25.0  5.38 22.2  7.1 -16.5 -21.0  3.2 -6.97  5.79  0.134
##                     101   113   117  123   144   148  152  154   178   198
## Predicted         67.66 23.57  20.0 26.0 14.58  22.8 60.6 69.5  52.3 77.63
## cvpred            66.05 24.71  21.3 27.0 15.24  22.8 58.9 67.5  52.0 77.08
## Survey_occupancy 67.50 22.50   0.0 22.5 22.50   0.0 80.0 80.0  40.0 80.00
## CV residual       1.45 -2.21 -21.3 -4.5  7.26 -22.8 21.1 12.5 -12.0  2.92
##                    205
## Predicted         27.3
## cvpred            28.1
## Survey_occupancy   0.0
## CV residual      -28.1
##
## Sum of squares = 4600    Mean square = 219    n = 21
##
## fold 10
## Observations in test set: 21
##                       4      8    21    22    35    43   49   77    78   83
## Predicted          3.94   9.93 27.97 18.39 15.40 16.21 24.0 27.5  8.30 13.1
## cvpred             3.77  10.06 28.64 18.57 15.43 16.12 24.3 27.6  7.47 12.5
## Survey_occupancy   0.00   0.00 22.50 22.50 22.50 22.50 22.5 45.0  0.00 22.5
## CV residual       -3.77 -10.06 -6.14  3.93  7.07  6.38 -1.8 17.4 -7.47 10.0
##                     90    94   112  138  142  149 162   169   179  185
## Predicted         21.5 28.14  21.2 11.0 16.4 23.4  42 42.68 42.68 14.8
## cvpred            21.3 27.94  20.4  8.8 14.5 22.5  42 42.33 42.33 12.8
## Survey_occupancy 45.0 22.50   0.0  0.0 45.0 40.0   0 40.00 40.00 40.0
```

```
## CV residual      23.7 -5.44 -20.4 -8.8 30.5 17.5 -42 -2.33 -2.33 27.2
##                    207
## Predicted        12.95
## cvpred            9.98
## Survey_occupancy 80.00
## CV residual      70.02
##
## Sum of squares = 10462    Mean square = 498    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 345

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  168.44 <2e-16 ***
## Room            1    193     193    0.59   0.44
## Course_Level    5   2628     526    1.60   0.16
## Residuals     205  67451     329
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      6   11   12   19    30    34   48    54    76     89
## Predicted         9.29 12.7 27.1 26.6 24.37 26.87 27.6 17.30  31.8   9.88
## cvpred            9.82 11.7 27.2 26.6 24.51 25.49 27.7 17.61  33.2  10.34
```

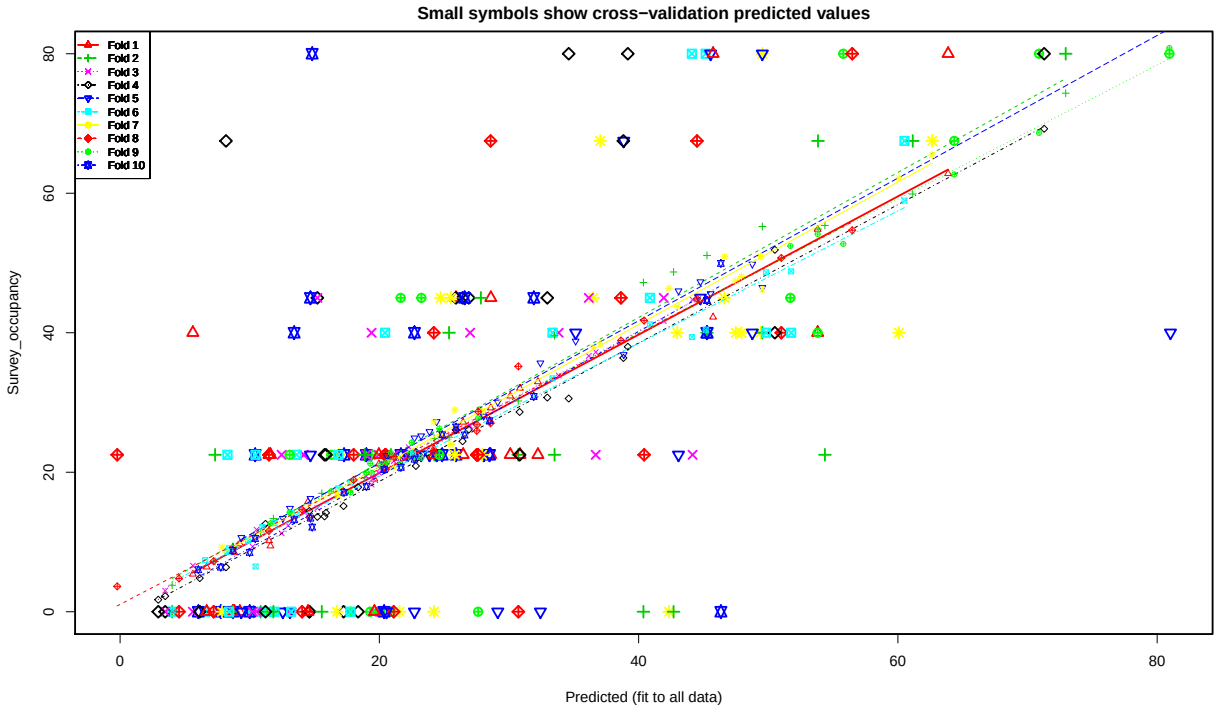
```
## Survey_occupancy  0.00 22.5 45.0 45.0 22.50 22.50 22.5 22.50  22.5   0.00
## CV residual      -9.82 10.8 17.8 18.4 -2.01 -2.99 -5.2  4.89 -10.7 -10.34
##                     120   122  134   136   168  188   196   202  203   206
## Predicted        23.101 30.95 13.3  9.33  53.1 62.5  13.2  22.3 49.3  7.20
## cvpred           21.761 30.87 12.2  9.81  53.9 60.9  13.5  22.4 47.2  7.67
## Survey_occupancy 22.500 22.50 22.5  0.00  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual       0.739 -8.37 10.3 -9.81 -13.9 19.1 -13.5 -22.4 32.8 32.33
##                    213
## Predicted         8.29
## cvpred            8.74
## Survey_occupancy  0.00
## CV residual      -8.74
##
## Sum of squares = 4863    Mean square = 232    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17    18    42     47    74    86   91   106
## Predicted         10.4 31.99  10.9 17.46 21.651  6.23  34.6 51.6 60.88
## cvpred            11.0 31.75  11.6 17.92 21.681  6.36  40.7 52.2 59.97
## Survey_occupancy   0.0 22.50   0.0 22.50 22.500  0.00  22.5 67.5 67.50
## CV residual      -11.0 -9.25 -11.6  4.58  0.819 -6.36 -18.2 15.3  7.53
##                    107  118   125   133  146   160   174   176   182   183
## Predicted         52.1 25.7 17.66  8.95 28.8  11.0  44.4  48.7  14.3 71.76
## cvpred            52.7 26.0 17.49  9.01 28.8  11.8  50.4  54.6  15.0 71.92
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0   0.0  40.0  40.0   0.0 80.00
## CV residual      -30.2 19.0  5.01 13.49 11.2 -11.8 -10.4 -14.6 -15.0  8.08
##                    189   191   215
## Predicted         39.0  10.5  44.4
## cvpred            45.1  11.3  50.4
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -45.1 -11.3 -50.4
##
## Sum of squares = 8082    Mean square = 367    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     7    27    40    55    57    62   69
## Predicted         13.1 15.12 15.12  17.3 17.30  37.4 36.89  45.1 23.1
## cvpred            13.0 15.42 15.42  17.6 17.62  38.0 37.43  45.7 24.4
## Survey_occupancy   0.0 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.5
## CV residual      -13.0  7.08  7.08 -17.6  4.88 -15.5  7.57 -23.2 -1.9
##                     79    92    95    98   103   108   128  139  166  175
## Predicted         7.86  19.3 41.29 10.42 18.20 20.38  12.2 15.9 27.2 18.6
## cvpred            8.47  20.0 41.31  9.76 18.92 21.12  12.9 15.3 26.5 17.5
## Survey_occupancy  0.00   0.0 45.00 22.50 22.50 22.50   0.0 45.0 40.0 40.0
## CV residual      -8.47 -20.0  3.69 12.74  3.58  1.38 -12.9 29.7 13.5 22.5
##                    187   194   209
## Predicted         8.83 33.71  5.02
## cvpred            7.59 33.08  3.74
## Survey_occupancy  0.00 40.00  0.00
## CV residual      -7.59  6.92 -3.74
##
## Sum of squares = 3964    Mean square = 180    n = 22
```

```
##
## fold 4
## Observations in test set: 22
##                       3     5   29    45   53   58   60   67     70    82
## Predicted          17.5 16.75 24.1  15.7 24.4 26.2 33.6 14.7 23.284  9.33
## cvpred             15.9 15.41 23.4  14.3 22.9 24.5 31.9 13.3 21.808  8.23
## Survey_occupancy    0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.500 67.50
## CV residual       -15.9  7.09 21.6 -14.3 22.1 20.5 13.1 31.7  0.692 59.27
##                     130   135   140   141  161   172   180   186  197   201
## Predicted         40.7 32.58 17.34  6.61 36.4 72.36  13.7  49.3 39.2  5.02
## cvpred            39.2 31.18 16.24  5.57 33.3 70.41  12.8  50.3 37.9  4.27
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.00   0.0  40.0 80.0  0.00
## CV residual       28.3 -8.68  6.26 -5.57 46.7  9.59 -12.8 -10.3 42.1 -4.27
##                     210   216
## Predicted          12.3  4.48
## cvpred             14.0  3.74
## Survey_occupancy    0.0  0.00
## CV residual       -14.0 -3.74
##
## Sum of squares = 12073    Mean square = 549    n = 22
##
## fold 5
## Observations in test set: 21
##                       16    32    33    61   64    66    68    75    80   85
## Predicted          13.8 20.02 26.32 24.92 24.7  33.1  44.3  25.0  15.2 40.0
## cvpred             13.8 21.34 26.58 26.35 24.9  34.7  45.0  26.5  16.5 37.0
## Survey_occupancy    0.0 22.50 22.50 22.50 22.5   0.0  22.5   0.0   0.0 67.5
## CV residual       -13.8  1.16 -4.08 -3.85 -2.4 -34.7 -22.5 -26.5 -16.5 30.5
##                     102   127   132    156   159  163   171   192 195   208
## Predicted         42.32 24.03 15.32 36.923  83.7 48.7  29.4  49.0  46  11.0
## cvpred            45.66 24.74 15.83 40.281  88.2 46.1  31.2  51.2  47  11.6
## Survey_occupancy 45.00 22.50 22.50 40.000  40.0 80.0   0.0  40.0  80   0.0
## CV residual       -0.66 -2.24  6.67 -0.281 -48.2 33.9 -31.2 -11.2  33 -11.6
##                     214
## Predicted          22.4
## cvpred             23.3
## Survey_occupancy    0.0
## CV residual       -23.3
##
## Sum of squares = 10222    Mean square = 487    n = 21
##
## fold 6
## Observations in test set: 21
##                       9    63    72    73   93    99   104    109   111
## Predicted          11.9 13.10  7.66  7.70 20.8 16.03 40.20  3.902 10.43
## cvpred             12.2 12.62  7.35  7.95 20.6 16.93 40.21  0.181  6.51
## Survey_occupancy    0.0 22.50 22.50  0.00 22.5 22.50 45.00  0.000 22.50
## CV residual       -12.2  9.88 15.15 -7.95  1.9  5.57  4.79 -0.181 15.99
##                     115   137   143   153   155  158  181  184   190   199
## Predicted         59.79  10.4  14.9  14.3  20.3 23.0 43.9 42.8  50.4  53.6
## cvpred            59.19  10.6  15.9  14.9  20.7 23.3 41.0 39.9  50.7  50.4
## Survey_occupancy 67.50   0.0   0.0   0.0   0.0 40.0 80.0 80.0  40.0  40.0
## CV residual       8.31 -10.6 -15.9 -14.9 -20.7 16.7 39.0 40.1 -10.7 -10.4
##                     200   212
```

```
## Predicted         10.9 35.50
## cvpred            12.4 35.43
## Survey_occupancy   0.0 40.00
## CV residual      -12.4  4.57
##
## Sum of squares = 5744    Mean square = 274    n = 21
##
## fold 7
## Observations in test set: 21
##                      15    20    23  38    41   46   51    52   81   100
## Predicted         22.2 14.58  13.6  22 23.60 34.7 34.2  18.9 26.4 26.21
## cvpred            21.9 13.89  13.2  24 25.72 35.2 34.6  18.5 25.2 26.75
## Survey_occupancy   0.0 22.50   0.0   0 22.50 67.5 45.0   0.0 45.0 22.50
## CV residual      -21.9  8.61 -13.2 -24 -3.22 32.3 10.4 -18.5 19.8 -4.25
##                    105   110   119   124    129  150  157   164   170   177
## Predicted        22.9 61.97  41.6 45.96   9.49 46.8 51.6 47.12  50.0  60.9
## cvpred           23.3 64.28  45.0 49.64  11.08 48.5 49.0 47.36  51.9  63.5
## Survey_occupancy 45.0 67.50   0.0 45.00   0.00 40.0 80.0 40.00  40.0  40.0
## CV residual      21.7  3.22 -45.0 -4.64 -11.08 -8.5 31.0 -7.36 -11.9 -23.5
##                   204
## Predicted        49.29
## cvpred           49.66
## Survey_occupancy 40.00
## CV residual      -9.66
##
## Sum of squares = 7748    Mean square = 369    n = 21
##
## fold 8
## Observations in test set: 21
##                     14    24   26    44    50    65    71     84    87
## Predicted        12.7 25.46 25.8  12.2 17.84 18.39  41.2 21.853  15.3
## cvpred           12.0 25.83 25.1  11.5 18.19 18.74  41.7 21.949  15.4
## Survey_occupancy 22.5 22.50 22.5   0.0 22.50 22.50  22.5 22.500   0.0
## CV residual      10.5 -3.33 -2.6 -11.5  4.31  3.76 -19.2  0.551 -15.4
##                     88   97    114   116  121   126   131   151   165  167
## Predicted         9.49 28.0 -0.452  31.1 43.5 37.48 29.31  24.5  51.7 23.5
## cvpred            8.77 27.3  3.613  35.3 43.9 37.87 29.68  24.8  52.1 23.6
## Survey_occupancy  0.00 67.5 22.500   0.0 67.5 45.00 22.50   0.0  40.0 40.0
## CV residual      -8.77 40.2 18.887 -35.3 23.6  7.13 -7.18 -24.8 -12.1 16.4
##                   173   211
## Predicted        55.8  6.11
## cvpred           54.8  6.16
## Survey_occupancy 80.0  0.00
## CV residual      25.2 -6.16
##
## Sum of squares = 6554    Mean square = 312    n = 21
##
## fold 9
## Observations in test set: 21
##                     10    25   28    31    36    37    39    56    59    96
## Predicted        24.4 18.39 19.8 16.75  17.8  17.5 17.07  11.9 15.82 49.40
## cvpred           24.3 18.51 18.7 16.93  18.0  17.4 16.07  12.2 15.86 48.95
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.00
## CV residual      20.7  3.99 26.3  5.57 -18.0 -17.4  6.43 -12.2  6.64 -3.95
```

```
##                     101   113   117    123   144   148  152   154   178
## Predicted        64.15 20.22  17.0 22.397 13.69  20.3 59.8 73.39  53.1
## cvpred           63.26 20.64  17.5 22.742 14.33  21.2 59.6 72.66  53.5
## Survey_occupancy 67.50 22.50   0.0 22.500 22.50   0.0 80.0 80.00  40.0
## CV residual       4.24  1.86 -17.5 -0.242  8.17 -21.2 20.4  7.34 -13.5
##                     198   205
## Predicted        79.92  30.4
## cvpred           78.97  31.2
## Survey_occupancy 80.00   0.0
## CV residual       1.03 -31.2
##
## Sum of squares = 4514    Mean square = 215    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21   22    35    43    49   77    78   83
## Predicted          8.59  8.75 24.15 19.5 16.75 14.89 26.01 32.9  7.16 12.8
## cvpred             7.12  9.36 24.96 18.6 15.73 15.21 25.48 32.2  6.47 11.7
## Survey_occupancy   0.00  0.00 22.50 22.5 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual       -7.12 -9.36 -2.46  3.9  6.77  7.29 -2.98 12.8 -6.47 10.8
##                     90   94 112   138  142  149   162   169   179  185  207
## Predicted        27.5 24.2  18  11.7 15.3 26.1  48.4 44.40 44.40 12.1 17.4
## cvpred           26.5 23.8  18  10.6 15.1 23.2  51.5 43.12 43.12 10.5 14.0
## Survey_occupancy 45.0 22.5   0   0.0 45.0 40.0   0.0 40.00 40.00 40.0 80.0
## CV residual      18.5 -1.3 -18 -10.6 29.9 16.8 -51.5 -3.12 -3.12 29.5 66.0
##
## Sum of squares = 10446    Mean square = 497    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 348

## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  167.61 <2e-16 ***
## Factor_Time     3    266      89    0.27   0.85
## Course_Level    5   2885     577    1.74   0.13
## Residuals     203  67121     331
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                        6   11   12   19    30    34    48    54    76    89
## Predicted           9.24 11.5 25.9 28.6 26.47 28.58 30.10 19.96 30.85  8.70
## cvpred              9.73 10.2 25.9 29.2 27.17 27.33 30.92 21.18 32.04  9.21
## Survey_occupancy    0.00 22.5 45.0 45.0 22.50 22.50 22.50 22.50 22.50  0.00
## CV residual        -9.73 12.3 19.1 15.8 -4.67 -4.83 -8.42  1.32 -9.54 -9.21
##                      120   122   134   136   168  188   196   202  203
## Predicted         24.211  32.2 11.60  8.81  53.8 63.9  14.5  19.6 45.7
## cvpred            23.394  33.0  9.43  8.46  54.8 62.8  15.8  19.0 42.2
## Survey_occupancy  22.500  22.5 22.50  0.00  40.0 80.0   0.0   0.0 80.0
## CV residual       -0.894 -10.5 13.07 -8.46 -14.8 17.2 -15.8 -19.0 37.8
##                      206   213
## Predicted           5.61  6.68
## cvpred              5.39  6.41
## Survey_occupancy   40.00  0.00
## CV residual        34.61 -6.41
##
## Sum of squares = 5296    Mean square = 252    n = 21
##
## fold 2
## Observations in test set: 22
##                       13    17    18     42    47    74    86   91   106
## Predicted           10.3 30.71  10.8 20.896 24.23  4.02  33.5 53.8 61.15
## cvpred              10.9 30.22  11.4 22.176 24.86  3.80  39.6 54.9 59.89
## Survey_occupancy     0.0 22.50   0.0 22.500 22.50  0.00  22.5 67.5 67.50
## CV residual        -10.9 -7.72 -11.4  0.324 -2.36 -3.80 -17.1 12.6  7.61
##                       107  118   125   133  146   160   174   176   182   183
## Predicted           54.4 27.8 18.88  7.33 25.4  8.70  45.3  49.5  15.6 72.94
```

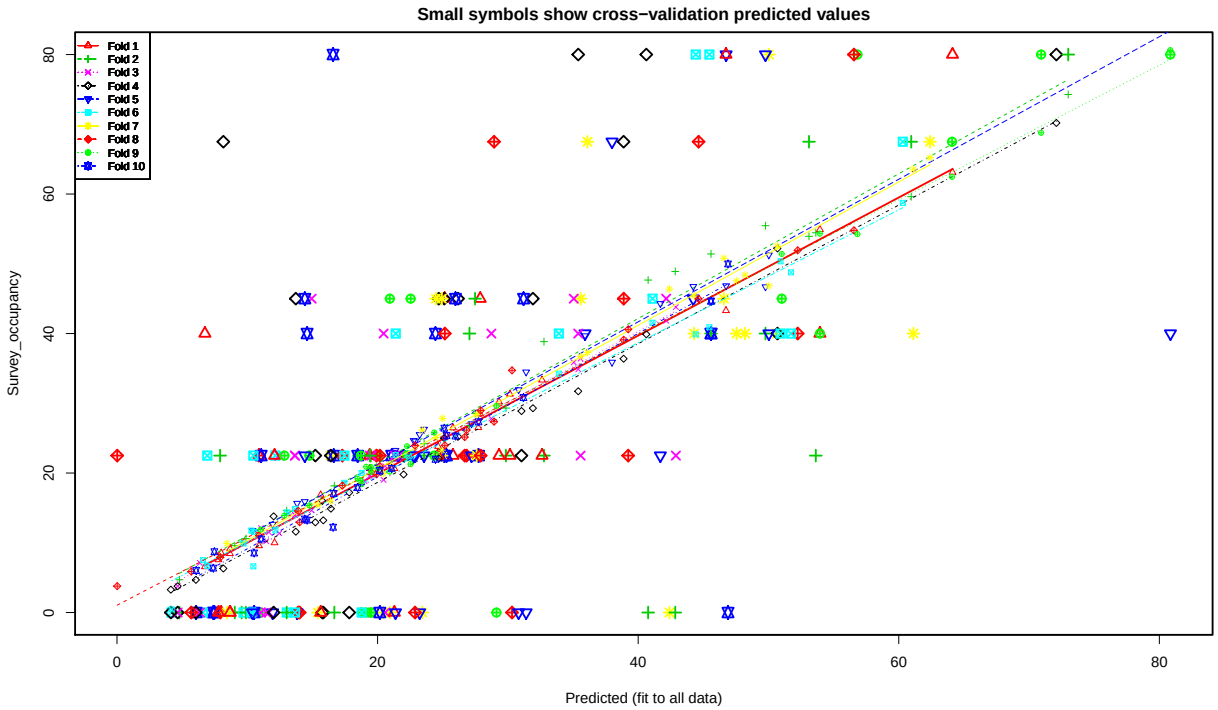
```
## cvpred            55.4 28.9 19.21  7.22 25.0  9.37  51.1  55.2  17.0 74.34
## Survey_occupancy  22.5 45.0 22.50 22.50 40.0  0.00  40.0  40.0   0.0 80.00
## CV residual      -32.9 16.1  3.29 15.28 15.0 -9.37 -11.1 -15.2 -17.0  5.66
##                    189   191   215
## Predicted         40.4  11.8  42.7
## cvpred            47.2  13.4  48.7
## Survey_occupancy   0.0   0.0   0.0
## CV residual      -47.2 -13.4 -48.7
##
## Sum of squares = 8189    Mean square = 372    n = 22
##
## fold 3
## Observations in test set: 22
##                      1     2     7    27   40    55    57    62    69
## Predicted         13.0 14.17 14.17  19.5 20.0  36.7 36.16  44.2 22.27
## cvpred            12.4 14.33 14.33  19.1 19.9  37.2 36.68  44.7 23.59
## Survey_occupancy   0.0 22.50 22.50   0.0 22.5  22.5 45.00  22.5 22.50
## CV residual      -12.4  8.17  8.17 -19.1  2.6 -14.7  8.32 -22.2 -1.09
##                     79    92    95   98   103    108   128  139  166  175
## Predicted         5.62  20.0 41.94 12.5 18.98 21.111  10.5 15.2 27.0 19.4
## cvpred            6.61  20.5 41.68 11.2 19.45 21.601  11.8 14.8 26.6 18.2
## Survey_occupancy  0.00   0.0 45.00 22.5 22.50 22.500   0.0 45.0 40.0 40.0
## CV residual      -6.61 -20.5  3.32 11.3  3.05  0.899 -11.8 30.2 13.4 21.8
##                    187   194   209
## Predicted        10.23 33.83  3.48
## cvpred            9.33 33.86  3.02
## Survey_occupancy  0.00 40.00  0.00
## CV residual      -9.33  6.14 -3.02
##
## Sum of squares = 3888    Mean square = 177    n = 22
##
## fold 4
## Observations in test set: 22
##                      3     5   29    45   53   58   60   67   70    82
## Predicted         17.2 15.77 25.9  18.4 26.9 26.4 33.0 15.2 22.8  8.17
## cvpred            15.2 13.67 26.0  17.9 26.1 24.4 30.7 13.6 20.9  6.37
## Survey_occupancy   0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.5 67.50
## CV residual      -15.2  8.83 19.0 -17.9 18.9 20.6 14.3 31.4  1.6 61.13
##                    130   135   140   141  161  172   180   186  197   201
## Predicted        38.8 30.82 15.88  6.15 34.6 71.3  14.6  50.5 39.2  3.48
## cvpred           36.4 28.64 14.18  4.82 30.6 69.2  14.4  51.9 38.0  2.24
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.0   0.0  40.0 80.0  0.00
## CV residual      31.1 -6.14  8.32 -4.82 49.4 10.8 -14.4 -11.9 42.0 -2.24
##                    210   216
## Predicted         11.2  2.95
## cvpred            12.6  1.72
## Survey_occupancy   0.0  0.00
## CV residual      -12.6 -1.72
##
## Sum of squares = 12633    Mean square = 574    n = 22
##
## fold 5
## Observations in test set: 21
##                      16     32    33    61    64    66    68    75    80
```

```
## Predicted         12.6 22.197 28.05 24.42 23.87  32.4  43.1  22.7  13.1
## cvpred            13.4 22.763 28.05 27.26 25.82  35.7  46.0  24.9  14.8
## Survey_occupancy   0.0 22.500 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual      -13.4 -0.263 -5.55 -4.76 -3.32 -35.7 -23.5 -24.9 -14.8
##                    85   102   127   132  156 159  163   171   192  195
## Predicted        38.8 44.77 23.22 14.68 35.1  81 49.5  29.1 48.77 45.6
## cvpred           36.9 47.31 25.21 16.24 38.8  87 46.5  30.0 49.84 45.6
## Survey_occupancy 67.5 45.00 22.50 22.50 40.0  40 80.0   0.0 40.00 80.0
## CV residual      30.6 -2.31 -2.71  6.26  1.2 -47 33.5 -30.0 -9.84 34.4
##                     208   214
## Predicted          9.35  20.6
## cvpred            10.64  22.4
## Survey_occupancy   0.00   0.0
## CV residual      -10.64 -22.4
##
## Sum of squares = 10032    Mean square = 478    n = 21
##
## fold 6
## Observations in test set: 21
##                      9    63    72    73   93    99  104    109   111
## Predicted         11.0 13.62  8.28  6.57 22.6 16.84 40.9  4.047 10.45
## cvpred            12.1 13.88  8.59  7.40 22.7 17.68 41.2  0.136  6.49
## Survey_occupancy   0.0 22.50 22.50  0.00 22.5 22.50 45.0  0.000 22.50
## CV residual      -12.1  8.62 13.91 -7.40 -0.2  4.82  3.8 -0.136 16.01
##                    115    137   143   153   155  158  181  184   190  199
## Predicted        60.51   9.88  13.2  11.9  17.8 20.4 45.2 44.1 49.82 51.8
## cvpred           58.94  10.17  14.2  12.7  18.5 21.2 40.4 39.4 48.66 48.8
## Survey_occupancy 67.50   0.00   0.0   0.0   0.0 40.0 80.0 80.0 40.00 40.0
## CV residual       8.56 -10.17 -14.2 -12.7 -18.5 18.8 39.6 40.6 -8.66 -8.8
##                    200   212
## Predicted         8.41 33.36
## cvpred            9.09 33.46
## Survey_occupancy  0.00 40.00
## CV residual      -9.09  6.54
##
## Sum of squares = 5493    Mean square = 262    n = 21
##
## fold 7
## Observations in test set: 21
##                      15    20    23    38    41   46    51    52   81   100
## Predicted         21.1 16.86  16.7  24.2 25.81 37.0 36.50  21.6 25.5 27.93
## cvpred            20.7 16.59  17.0  27.2 28.93 38.4 37.88  22.1 24.0 28.79
## Survey_occupancy   0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0 22.50
## CV residual      -20.7  5.91 -17.0 -27.2 -6.43 29.1  7.12 -22.1 21.0 -6.29
##                    105   110   119   124   129   150  157   164   170   177
## Predicted        24.7 62.64  42.4 46.62  7.86 42.98 49.5 47.94  49.4  60.1
## cvpred           25.4 65.47  46.4 50.89  9.26 43.74 46.2 48.06  50.9  62.2
## Survey_occupancy 45.0 67.50   0.0 45.00  0.00 40.00 80.0 40.00  40.0  40.0
## CV residual      19.6  2.03 -46.4 -5.89 -9.26 -3.74 33.8 -8.06 -10.9 -22.2
##                    204
## Predicted        47.50
## cvpred           47.43
## Survey_occupancy 40.00
## CV residual      -7.43
```

```
##
## Sum of squares = 7949    Mean square = 378    n = 21
##
## fold 8
## Observations in test set: 21
##                      14   24    26    44    50   65    71    84    87    88
## Predicted        11.5 27.5 27.51  14.6 20.49 18.0  40.4 20.44  14.0  7.22
## cvpred           11.6 26.8 25.94  13.5 20.39 18.9  41.7 21.16  14.6  7.24
## Survey_occupancy 22.5 22.5 22.50   0.0 22.50 22.5  22.5 22.50   0.0  0.00
## CV residual      10.9 -4.3 -3.44 -13.5  2.11  3.6 -19.2  1.34 -14.6 -7.24
##                      97    114   116  121   126   131   151   165  167  173
## Predicted        28.6 -0.221  30.7 44.5 38.64 27.62  21.1  51.0 24.2 56.5
## cvpred           27.0  3.637  35.2 44.9 38.88 28.69  22.2  50.7 23.0 54.7
## Survey_occupancy 67.5 22.500   0.0 67.5 45.00 22.50   0.0  40.0 40.0 80.0
## CV residual      40.5 18.863 -35.2 22.6  6.12 -6.19 -22.2 -10.7 17.0 25.3
##                     211
## Predicted         4.55
## cvpred            4.77
## Survey_occupancy  0.00
## CV residual      -4.77
##
## Sum of squares = 6371    Mean square = 303    n = 21
##
## fold 9
## Observations in test set: 21
##                      10    25   28    31    36    37    39    56    59    96
## Predicted        23.2 20.60 21.6 19.00  20.1  20.9 19.41  11.6 16.28 51.70
## cvpred           22.1 21.46 21.2 19.95  21.0  22.8 19.89  12.7 17.27 52.45
## Survey_occupancy 45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.00
## CV residual      22.9  1.04 23.8  2.55 -21.0 -22.8  2.61 -12.7  5.23 -7.45
##                     101   113   117   123   144   148  152  154   178
## Predicted        64.35 22.50  19.3 24.63 13.08  17.8 55.8 70.9  53.8
## cvpred           62.69 24.26  21.2 26.27 14.26  17.1 52.7 68.6  54.2
## Survey_occupancy 67.50 22.50   0.0 22.50 22.50   0.0 80.0 80.0  40.0
## CV residual       4.81 -1.76 -21.2 -3.77  8.24 -17.1 27.3 11.4 -14.2
##                     198   205
## Predicted        80.947  27.6
## cvpred           80.824  27.8
## Survey_occupancy 80.000   0.0
## CV residual      -0.824 -27.8
##
## Sum of squares = 5004    Mean square = 238    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21   22    35    43    49   77    78   83
## Predicted         7.77  8.70 25.91 21.7 19.00 17.27 28.50 31.9  6.04 10.4
## cvpred            6.39  8.78 26.47 20.7 17.94 17.12 27.38 30.9  6.02 10.5
## Survey_occupancy  0.00  0.00 22.50 22.5 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual      -6.39 -8.78 -3.97  1.8  4.56  5.38 -4.88 14.1 -6.02 12.0
##                     90    94   112  138  142  149   162   169   179  185
## Predicted        26.6 24.85  20.4 10.0 14.7 22.7  46.3 45.27 45.27 13.4
## cvpred           25.3 25.37  20.4  8.5 13.4 21.9  49.9 44.63 44.63 13.2
## Survey_occupancy 45.0 22.50   0.0  0.0 45.0 40.0   0.0 40.00 40.00 40.0
```

```
## CV residual      19.7 -2.87 -20.4 -8.5 31.6 18.1 -49.9 -4.63 -4.63 26.8
##                   207
## Predicted        14.8
## cvpred           12.1
## Survey_occupancy 80.0
## CV residual      67.9
##
## Sum of squares = 10661    Mean square = 508    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 355
```

```
## Analysis of Variance Table
##
## Response: Survey_occupancy
##                Df Sum Sq Mean Sq F value Pr(>F)
## Wifi_Max_logs   1  55421   55421  167.16 <2e-16 ***
## Room            1    193     193    0.58   0.45
## Factor_Time     3    309     103    0.31   0.82
## Course_Level    5   2797     559    1.69   0.14
## Residuals     202  66973     332
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```




```
##
## fold 1
## Observations in test set: 21
##                      6    11    12    19    30    34    48    54    76    89
## Predicted         8.00 10.90 25.1 27.9 25.79 27.73 29.32 19.39 30.16  8.69
```

```
## cvpred            8.52  9.57 25.1 28.5 26.48 26.52 30.19 20.64 31.31  9.15
## Survey_occupancy  0.00 22.50 45.0 45.0 22.50 22.50 22.50 22.50 22.50  0.00
## CV residual      -8.52 12.93 19.9 16.5 -3.98 -4.02 -7.69  1.86 -8.81 -9.15
##                    120   122  134   136   168  188   196   202  203   206
## Predicted        24.64  32.6 12.1  8.67  53.9 64.1  15.6  21.3 46.7  6.75
## cvpred           23.82  33.3 10.0  8.45  54.9 63.1  16.9  20.6 43.3  6.56
## Survey_occupancy 22.50  22.5 22.5  0.00  40.0 80.0   0.0   0.0 80.0 40.00
## CV residual      -1.32 -10.8 12.5 -8.45 -14.9 16.9 -16.9 -20.6 36.7 33.44
##                    213
## Predicted         7.79
## cvpred            7.57
## Survey_occupancy  0.00
## CV residual      -7.57
##
## Sum of squares = 5250    Mean square = 250    n = 21
##
## fold 2
## Observations in test set: 22
##                      13    17     18    42    47    74    86   91   106
## Predicted          9.04 29.85   9.56 19.48 23.57  4.80  32.8 53.1 60.96
## cvpred             9.58 29.31  10.09 20.69 24.21  4.69  38.8 53.9 59.62
## Survey_occupancy   0.00 22.50   0.00 22.50 22.50  0.00  22.5 67.5 67.50
## CV residual       -9.58 -6.81 -10.09  1.81 -1.71 -4.69 -16.3 13.6  7.88
##                     107  118   125   133  146   160   174   176   182   183
## Predicted          53.6 27.5 19.42  7.91 27.1   9.9  45.6  49.8  16.7 73.01
## cvpred             54.4 28.6 19.86  7.92 26.8  10.6  51.4  55.5  18.2 74.27
## Survey_occupancy   22.5 45.0 22.50 22.50 40.0   0.0  40.0  40.0   0.0 80.00
## CV residual       -31.9 16.4  2.64 14.58 13.2 -10.6 -11.4 -15.5 -18.2  5.73
##                     189   191   215
## Predicted          40.8  13.0  42.8
## cvpred             47.7  14.6  48.9
## Survey_occupancy    0.0   0.0   0.0
## CV residual       -47.7 -14.6 -48.9
##
## Sum of squares = 8188    Mean square = 372    n = 22
##
## fold 3
## Observations in test set: 22
##                       1     2     7    27    40    55    57    62     69
## Predicted          11.7 13.66 13.66  19.0 19.39  35.6 35.06  42.9 21.329
## cvpred             11.5 13.97 13.97  18.8 19.57  36.4 35.87  43.8 22.949
## Survey_occupancy    0.0 22.50 22.50   0.0 22.50  22.5 45.00  22.5 22.500
## CV residual       -11.5  8.53  8.53 -18.8  2.93 -13.9  9.13 -21.3 -0.449
##                      79    92    95   98   103    108   128  139  166  175
## Predicted          6.36  20.6 42.15 12.5 19.54 21.629  11.0 14.9 28.7 20.5
## cvpred             7.12  21.0 41.83 11.4 19.92 22.038  12.1 14.6 27.8 19.0
## Survey_occupancy   0.00   0.0 45.00 22.5 22.50 22.500   0.0 45.0 40.0 40.0
## CV residual       -7.12 -21.0  3.17 11.1  2.58  0.462 -12.1 30.4 12.2 21.0
##                     187   194   209
## Predicted          11.5 35.40  4.66
## cvpred             10.2 34.87  3.79
## Survey_occupancy    0.0 40.00  0.00
## CV residual       -10.2  5.13 -3.79
##
```

```
## Sum of squares = 3807    Mean square = 173    n = 22
##
## fold 4
## Observations in test set: 22
##                       3     5   29    45   53   58   60   67   70    82
## Predicted          15.8 15.22 25.1  17.8 26.2 24.7 31.9 13.7 22.0  8.16
## cvpred             13.2 12.93 25.0  17.2 25.2 22.1 29.3 11.6 19.8  6.31
## Survey_occupancy    0.0 22.50 45.0   0.0 45.0 45.0 45.0 45.0 22.5 67.50
## CV residual       -13.2  9.57 20.0 -17.2 19.8 22.9 15.7 33.4  2.7 61.19
##                    130   135   140   141  161  172   180   186  197   201
## Predicted         38.9 31.05 16.42  6.06 35.4 72.1  15.8  50.7 40.6  4.66
## cvpred            36.4 28.89 14.89  4.68 31.7 70.2  16.0  52.2 39.9  3.78
## Survey_occupancy 67.5 22.50 22.50  0.00 80.0 80.0   0.0  40.0 80.0  0.00
## CV residual       31.1 -6.39  7.61 -4.68 48.3  9.8 -16.0 -12.2 40.1 -3.78
##                     210   216
## Predicted          12.0  4.13
## cvpred             13.8  3.28
## Survey_occupancy    0.0  0.00
## CV residual       -13.8 -3.28
##
## Sum of squares = 12737    Mean square = 579    n = 22
##
## fold 5
## Observations in test set: 21
##                      16     32    33    61    64    66    68    75    80
## Predicted          11.9 21.607 27.21 23.56 22.90  31.4  41.7  23.2  13.8
## cvpred             12.6 22.175 27.06 26.28 24.59  34.5  44.3  25.5  15.7
## Survey_occupancy    0.0 22.500 22.50 22.50 22.50   0.0  22.5   0.0   0.0
## CV residual       -12.6  0.325 -4.56 -3.78 -2.09 -34.5 -21.8 -25.5 -15.7
##                     85   102   127  132    156   159  163   171   192  195
## Predicted         38.0 44.23 22.77 14.4 35.924  80.9 49.8  30.8  50.0 46.7
## cvpred            35.9 46.74 24.66 15.9 39.677  86.8 46.7  31.9  51.3 46.8
## Survey_occupancy 67.5 45.00 22.50 22.5 40.000  40.0 80.0   0.0  40.0 80.0
## CV residual       31.6 -1.74 -2.16  6.6  0.323 -46.8 33.3 -31.9 -11.3 33.2
##                     208   214
## Predicted          10.4  21.4
## cvpred             11.8  23.2
## Survey_occupancy    0.0   0.0
## CV residual       -11.8 -23.2
##
## Sum of squares = 10031    Mean square = 478    n = 21
##
## fold 6
## Observations in test set: 21
##                       9   63    72   73     93   99   104    109   111
## Predicted          10.5 12.2  6.93  6.6 22.384 17.4 41.10  4.197 10.47
## cvpred             11.6 11.8  6.65  7.5 22.394 18.6 41.55  0.451  6.62
## Survey_occupancy    0.0 22.5 22.50  0.0 22.500 22.5 45.00  0.000 22.50
## CV residual       -11.6 10.7 15.85 -7.5  0.106  3.9  3.45 -0.451 15.88
##                     115   137   143   153   155  158  181  184   190   199
## Predicted         60.31  9.71  13.7  13.0  18.8 21.4 45.5 44.4  50.9 51.73
## cvpred            58.74  9.91  14.9  14.4  20.0 22.6 40.9 39.9  50.4 48.77
## Survey_occupancy 67.50  0.00   0.0   0.0   0.0 40.0 80.0 80.0  40.0 40.00
## CV residual       8.76 -9.91 -14.9 -14.4 -20.0 17.4 39.1 40.1 -10.4 -8.77
```

```
##                     200   212
## Predicted          10.3 33.91
## cvpred             11.8 34.25
## Survey_occupancy    0.0 40.00
## CV residual       -11.8  5.75
##
## Sum of squares = 5635    Mean square = 268    n = 21
##
## fold 7
## Observations in test set: 21
##                       15    20    23    38    41   46    51    52   81   100
## Predicted          20.4 16.38  15.4  23.4 24.99 36.1 35.59  21.0 24.9 27.61
## cvpred             19.9 15.97  15.4  26.2 27.83 37.3 36.71  21.2 23.3 28.42
## Survey_occupancy    0.0 22.50   0.0   0.0 22.50 67.5 45.00   0.0 45.0 22.50
## CV residual       -19.9  6.53 -15.4 -26.2 -5.33 30.2  8.29 -21.2 21.7 -5.92
##                     105  110   119  124   129  150  157   164   170   177
## Predicted          24.5 62.4  42.4 46.6  8.44 44.3 50.0 48.20  50.7  61.1
## cvpred             25.1 65.2  46.4 50.8  9.90 45.4 46.8 48.38  52.5  63.6
## Survey_occupancy   45.0 67.5   0.0 45.0  0.00 40.0 80.0 40.00  40.0  40.0
## CV residual        19.9  2.3 -46.4 -5.8 -9.90 -5.4 33.2 -8.38 -12.5 -23.6
##                     204
## Predicted          47.55
## cvpred             47.55
## Survey_occupancy   40.00
## CV residual        -7.55
##
## Sum of squares = 7983    Mean square = 380    n = 21
##
## fold 8
## Observations in test set: 21
##                       14    24    26    44    50   65    71    84    87    88
## Predicted          10.9 26.83 26.69  14.0 19.92 17.3  39.2 20.18  13.9  7.93
## cvpred             11.0 26.16 25.15  12.9 19.82 18.2  40.6 20.97  14.6  7.91
## Survey_occupancy   22.5 22.50 22.50   0.0 22.50 22.5  22.5 22.50   0.0  0.00
## CV residual        11.5 -3.66 -2.65 -12.9  2.68  4.3 -18.1  1.53 -14.6 -7.91
##                       97     114   116  121  126   131   151   165  167  173
## Predicted          28.9  0.0178  30.3 44.6 38.9 27.91  22.9  52.2 25.2 56.6
## cvpred             27.4  3.7818  34.7 45.0 39.1 28.95  23.9  51.9 24.0 54.8
## Survey_occupancy   67.5 22.5000   0.0 67.5 45.0 22.50   0.0  40.0 40.0 80.0
## CV residual        40.1 18.7182 -34.7 22.5  5.9 -6.45 -23.9 -11.9 16.0 25.2
##                     211
## Predicted          5.70
## cvpred             5.87
## Survey_occupancy   0.00
## CV residual       -5.87
##
## Sum of squares = 6343    Mean square = 302    n = 21
##
## fold 9
## Observations in test set: 21
##                       10    25   28    31    36    37    39    56    59    96
## Predicted          22.5 20.04 20.9 18.47  19.5  19.5 18.73  11.0 14.77 51.02
## cvpred             21.3 20.65 20.2 19.18  20.2  20.9 18.93  11.9 15.36 51.41
## Survey_occupancy   45.0 22.50 45.0 22.50   0.0   0.0 22.50   0.0 22.50 45.00
```

```
## CV residual      23.7  1.85 24.8  3.32 -20.2 -20.9  3.57 -11.9  7.14 -6.41
##                    101   113   117   123  144   148  152  154   178    198
## Predicted        64.09 22.26  19.1 24.35 12.8  18.8 56.8 70.9  53.9 80.843
## cvpred           62.46 23.84  20.9 25.81 13.9  18.4 54.3 68.8  54.3 80.633
## Survey_occupancy 67.50 22.50   0.0 22.50 22.5   0.0 80.0 80.0  40.0 80.000
## CV residual       5.04 -1.34 -20.9 -3.31  8.6 -18.4 25.7 11.2 -14.3 -0.633
##                    205
## Predicted         29.1
## cvpred            29.6
## Survey_occupancy   0.0
## CV residual      -29.6
##
## Sum of squares = 5039    Mean square = 240    n = 21
##
## fold 10
## Observations in test set: 21
##                       4     8    21    22    35    43    49   77    78   83
## Predicted          7.39  7.47 25.12 21.08 18.47 16.64 27.75 31.2  6.07 11.1
## cvpred             6.37  8.72 26.43 20.67 17.91 17.08 27.34 30.8  6.02 10.5
## Survey_occupancy   0.00  0.00 22.50 22.50 22.50 22.50 22.50 45.0  0.00 22.5
## CV residual       -6.37 -8.72 -3.93  1.83  4.59  5.42 -4.84 14.2 -6.02 12.0
##                     90    94   112   138  142  149   162   169   179  185
## Predicted        26.0 25.29  20.2 10.53 14.4 24.4  46.9 45.59 45.59 14.6
## cvpred           25.3 25.39  20.4  8.53 13.4 22.0  50.0 44.64 44.64 13.2
## Survey_occupancy 45.0 22.50   0.0  0.00 45.0 40.0   0.0 40.00 40.00 40.0
## CV residual      19.7 -2.89 -20.4 -8.53 31.6 18.0 -50.0 -4.64 -4.64 26.8
##                   207
## Predicted        16.6
## cvpred           12.2
## Survey_occupancy 80.0
## CV residual      67.8
##
## Sum of squares = 10645    Mean square = 507    n = 21
##
## Overall (Sum over all 21 folds)
##  ms
## 355
```

Models	MSE
Survey_occupancy ~ 1	`attr(out.null.model, "ms")`
Survey_occupancy ~ Wifi_Max_logs	`attr(out.lm.max, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room	`attr(out.lm.max.room, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Factor_Time	`attr(out.lm.max.time, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Course_Level	`attr(out.lm.max.level, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room + Factor_Time	`attr(out.lm.max.room.time, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room + Course_Level	`attr(out.lm.max.room.level, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Factor_Time + Course_Level	`attr(out.lm.max.time.level, "ms")`
Survey_occupancy ~ Wifi_Max_logs + Room + Factor_Time + Course_Level	`attr(out.lm.max.full, "ms")`

The model with the lowest MSE was the model with only the Wi-Fi Max logs as response variable, which was slightly higher than the Wi-Fi Average best model. Therefore we are going to run the Survey_occupancy ~ Wifi_Average_logs on the whole dataset.

Looking at the model summary, the Wifi_Average_logs were significantly related to the Survey ground truth data.

```
summary(out.occupancy.lm.avg)
```

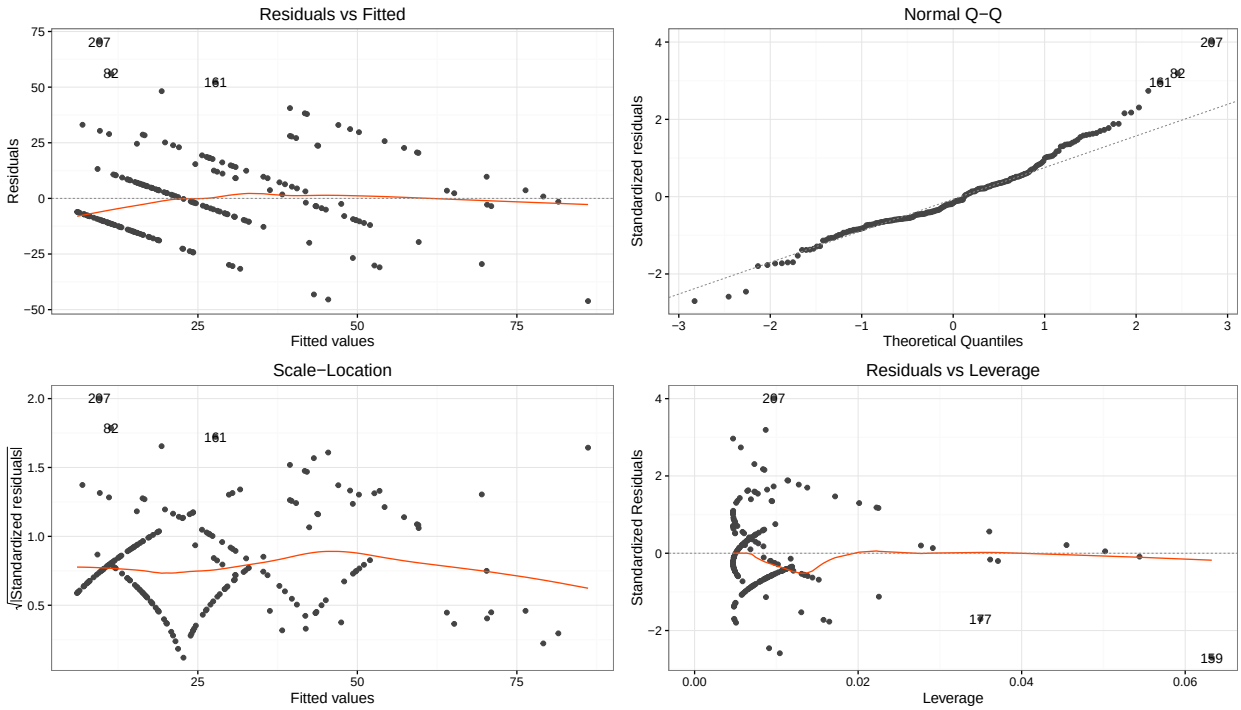
```
##
## Call:
## lm(formula = Survey_occupancy ~ Wifi_Average_logs, data = NoOutlierTable)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -46.16 -10.84  -2.83   8.56  70.43
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         6.0684     1.9280    3.15   0.0019 **
## Wifi_Average_logs   0.7253     0.0523   13.87   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 17.6 on 211 degrees of freedom
## Multiple R-squared:  0.477,  Adjusted R-squared:  0.475
## F-statistic:  192 on 1 and 211 DF,  p-value: <2e-16
```

However when we looked at the residuals, there were few issues. From the plot looking at the residual vs fitted values, we still could see that the Survey occupancy was assuming more or less the same values and this explain the line pattern of the graphs. The data were quite normal distributed, but the variance did not seem homogeneous.

```
library(ggfortify)
class(autoplot(out.occupancy.lm.avg))
```

```
## [1] "ggmultiplot"
## attr(,"package")
## [1] "ggfortify"
```

```
autoplot(out.occupancy.lm.avg, smooth.colour = 'orangered') + theme_bw()
```



Since the logaritmic transformation of the target features did not work, we ran a generalised linear model with a quasi-poisson GLM model, because the Poisson model suffered of overdispersion.

GENERALISED LINEAR MODEL WITH POISSON DISTRIBUTION

We run all the models using the package glm and cv.glm for running 10-fold cross validation and we took as best the model with the lowest raw cross-validation estimate of prediction (delta).

Models	Adjusted delta
Survey_occupancy ~ 1	`out.poisson.null$delta[2]`
Survey_occupancy ~ Wifi_Average_logs	`out.poisson.avg$delta[2]`
Survey_occupancy ~ Wifi_Average_logs + Room	`out.poisson.avg.room$delta[2]`
Survey_occupancy ~ Wifi_Average_logs + Factor_Time	`out.poisson.avg.time$delta[2]`
Survey_occupancy ~ Wifi_Average_logs + Course_Level	`out.poisson.avg.level$delta[2]`
Survey_occupancy ~ Wifi_Average_logs + Room + Factor_Time	`out.poisson.avg.room.time$delta`
Survey_occupancy ~ Wifi_Average_logs + Room + Course_Level	`out.poisson.avg.room.level$delt`
Survey_occupancy ~ Wifi_Average_logs + Factor_Time + Course_Level	`out.poisson.avg.time.level$delt`
Survey_occupancy ~ Wifi_Average_logs + Room + Factor_Time + Course_Level	`out.poisson.avg.full$delta[2]`

The best model was Survey_occupancy ~ Wifi_Average_logs with an adjusted cross-validation estimate of prediction error of 390. As for the linear regression we run all the model with the dependent variable Wifi_Max_logs.

Models	Adjusted delta
Survey_occupancy ~ 1	`out.poisson.null$delta[2]`
Survey_occupancy ~ Wifi_Max_logs	`out.poisson.max$delta[2]`
Survey_occupancy ~ Wifi_Max_logs + Room	`out.poisson.max.room$delta[2]`
Survey_occupancy ~ Wifi_Max_logs + Factor_Time	`out.poisson.max.time$delta[2]`

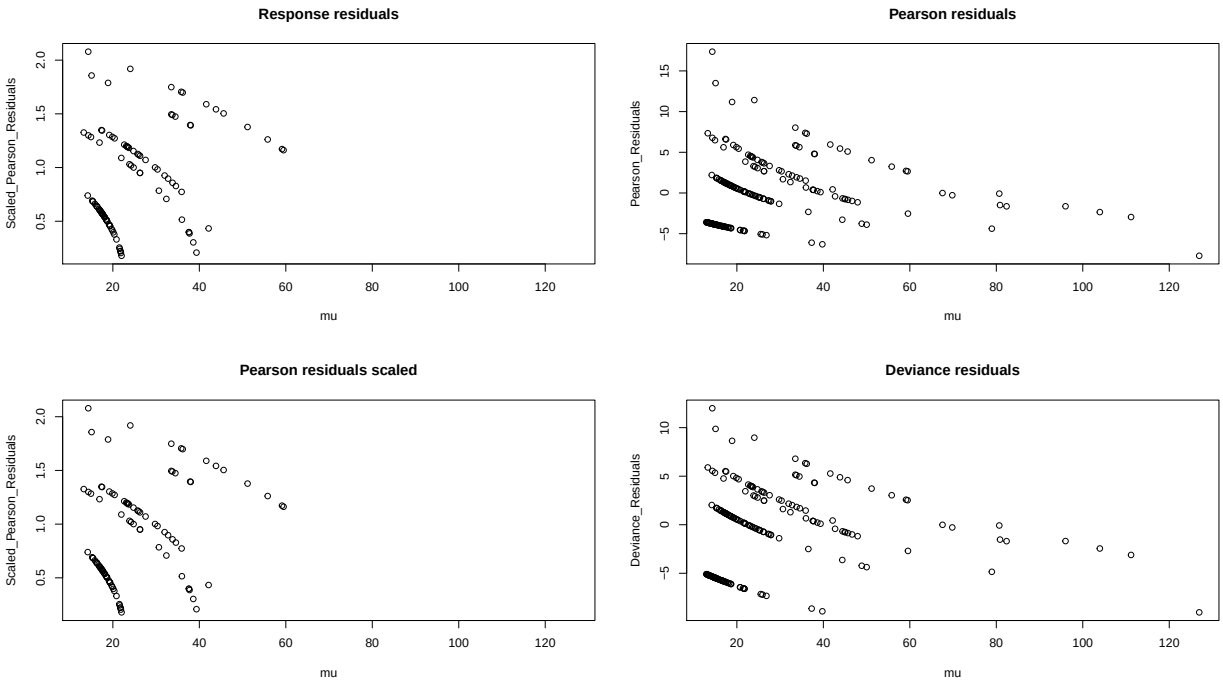
Models	Adjusted delta
Survey_occupancy ~ Wifi_Max_logs + Course_Level	`out.poisson.max.level$delta[2]`
Survey_occupancy ~ Wifi_Max_logs + Room + Factor_Time	`out.poisson.max.room.time$delta[2]`
Survey_occupancy ~ Wifi_Max_logs + Room + Course_Level	`out.poisson.max.room.level$delta[2`
Survey_occupancy ~ Wifi_Max_logs + Factor_Time + Course_Level	`out.poisson.max.time.level$delta[2`
Survey_occupancy ~ Wifi_Max_logs + Room + Factor_Time + Course_Level	`out.poisson.max.full$delta[2]`

The best model was the out.poisson.max with an adjusted cross-validation estimate of prediction error of: 394, which was slightly worst than the model with the average logs as predictor. Therefore we are going to run Survey_occupancy ~ Wifi_Average_logs this model on the whole dataset. To validate the model we plotted the following residuals, as suggested by Zuur et al. (2009): Ordinal residuals, Pearson residual, scaled Pearson residuals (to take into account the overdispersion) and the deviance residuals for the optimal quasi-Poisson model applied on the dataset without outliers. We plotted also the deviance residuals aganist the explanatory variable Wifi_Average_log to see whether there was any patterns.

```
Pearson_Residuals <- resid(out.avg, type = "pearson")
Deviance_Residuals <- resid(out.avg, type = "deviance")
mu <- predict(out.avg, type = "response")
Response_Residuals <- NoOutlierTable$Survey_occupancy - mu
Scaled_Pearson_Residuals <- Response_Residuals / sqrt(15.2 * Response_Residuals) #corrected by the over
```

```
## Warning in sqrt(15.2 * Response_Residuals): NaNs produced
```

```
op <- par(mfrow = c(2, 2))
plot(x = mu, y = Scaled_Pearson_Residuals, main = "Response residuals")
plot(x = mu, y = Pearson_Residuals, main = "Pearson residuals")
plot(x = mu, y = Scaled_Pearson_Residuals,
     main = "Pearson residuals scaled")
plot(x = mu, y = Deviance_Residuals, main = "Deviance residuals")
```



```
par(op)
```

From all the residuals plot we could see a pattern, the residuals were decresing as the average or mu of the fited values were decreasing, suggesting that the quasi-poisson glm was not appropriate. For double checking it, we checked if the variance of the residuals was proportional to the mean, as suggested by this tutorial (https://www.ssc.wisc.edu/sscc/pubs/RFR/RFR_Regression.html). For doing so we plotted the residuals aganist the predicted mean and in this graph we plotted 3 lines:

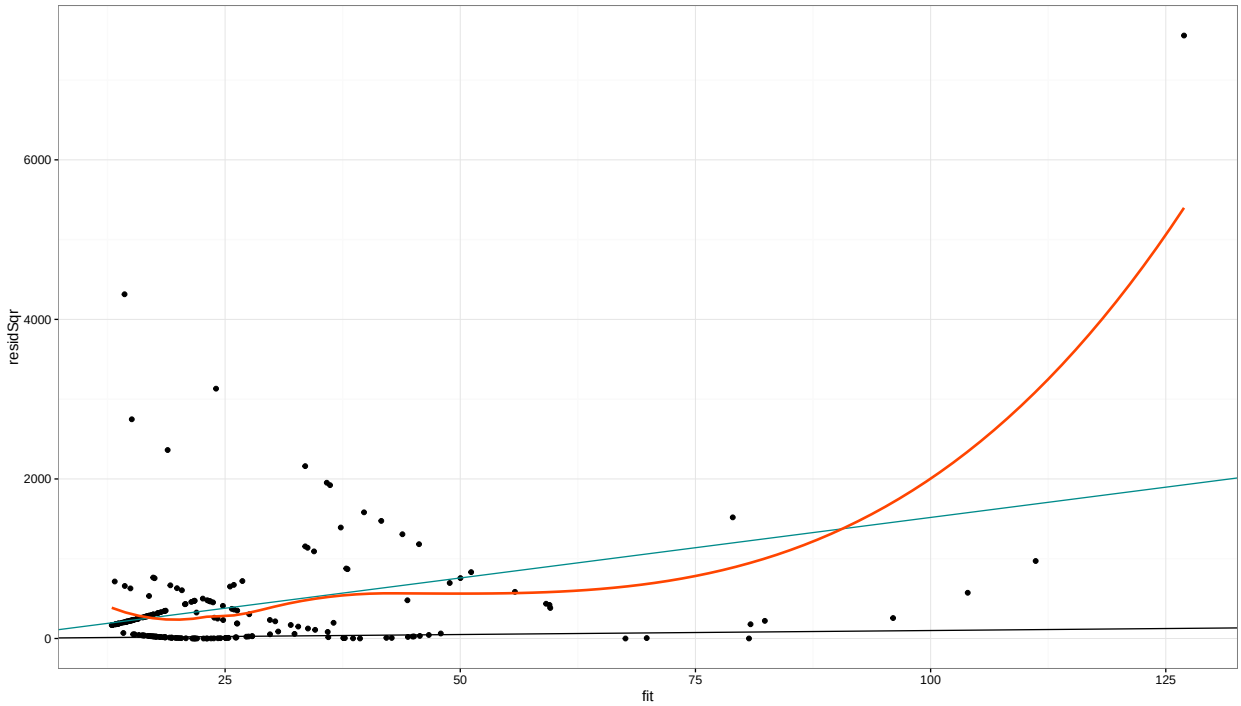
- a black line representing the Poisson assumed variance;
- a blue plotting the quasi-Poisson assumed variance;
- orange curve for the smoothed mean of the square of the residual.

In theory the orange line should be straight and it will be collinear with the blue line. Higher is the deviation of the orange line from the blue one, higher is the chance that the variance of the quasi-Poisson model is not proportional to the mean as aspected.

```
## Single term deletions
##
## Model:
## Survey_occupancy ~ Wifi_Average_logs
##                    Df Deviance AIC F value Pr(>F)
## <none>                   3773 Inf
## Wifi_Average_logs  1     5617 Inf     103 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#This plot reveal overdispersion, therefore we are trying to run the negative binomial distribution.
p1Diag <- data.frame(NoOutlierTable,
                     link=predict(p1, type="link"),
                     fit=predict(p1, type="response"),
                     pearson=residuals(p1,type="pearson"),
                     resid=residuals(p1,type="response"),
                     residSqr=residuals(p1,type="response")^2
)


ggplot(data=p1Diag, aes(x=fit, y=residSqr)) +
  geom_point() +
  geom_abline(intercept = 0, slope = 1) +
  geom_abline(intercept = 0, slope = summary(out.avg)$dispersion,
              color="darkcyan") +
  stat_smooth(method="loess", se = FALSE, color="orangered") +
  theme_bw()
```



As we can see from the graph, the orange smoothed mean of the square of the residual is diverging from the Poisson assumed variance. For this reason, the quasi-poisson model was not appropriate for our data. Therefore, we decided to run the model using a negative bionomial distribution that it is designed to deal with overdispersion. The negative bionomial model, however, has a very high dispersion parameter and it was suited for our data. Therefore the linear model was selected as our best model.